

The Iron Age

A Review of the Hardware and Metal Trades

Published every Thursday Morning by DAVID WILLIAMS, No. 80 Beekman Street, New York.

Vol. XI: No. 10.

New York, Thursday, March 6, 1873.

Four Dollars a Year.
Single Copies, Ten Cents.

Wood Working Machinery.

There are few interests in America so extensive or important as the wood-working industry. The great extent of our forests has permitted a lavish use of lumber for the many purposes of life, such as would not be thought of in countries where timber is scarce, and consequent upon the general adoption of wood has been the introduction and improvement of machines for its manufacture. In this country almost every village of two thousand or more inhabitants supports a saw and planing mill, and frequently a regular wood working manufactory furnished with appliances for planing, boring, mortising, tonguing and grooving, plain and scroll sawing, etc. America has accordingly taken the lead of other countries in wood working machines, and although they are sometimes of a less durable character than English machines, are nevertheless generally superior to them in effectiveness, first cost, and economy of operation.

The first manufactory of wood-cutting machines was established only 73 years ago, in London, by Sir Samuel Bentham, who seems to be the founder of the business. His efforts resulted in giving the business a decided impetus. It may be seen that considerable proficiency was rapidly attained in the business, by the fact that by 1800 there had been introduced the rotary planing and molding machine, the segmental circular saw, the conical cutter for dovetail grooves, the undulating carriage to form wave moldings, the compound cutter head to work two or more sides of lumber at once, tubular boring implements, the reciprocating and rotary mortise machines, the radius arm for sawing segments, the tracer guide for sawing irregular forms, the grooving table, the pivoted table for mortising machines, the forked or double mortise chisel, the rotary cutter for forming screw threads on wooden screws, double grooving saws, the rack feed for planing machines, and many other appliances. Indeed, more was accomplished in England previous to 1815, than was effected for thirty-five years afterward. Matters had not, however, remained at a standstill in America, for during the great exhibition of 1851, in London, a number of American machines were displayed and their performances created great astonishment in the minds of English engineers. From this date, wood cutting machinery, especially on this side of the water, advanced rapidly to a high degree of excellence.

Among the most important considerations respecting the use of this kind of machinery is the great variation in the density of the material to be wrought. Wood varies in hardness, from the soft fir timber of the northern climates, to the harder varieties of box wood, ebony and lignumvita. Great variations again occur with reference to the grain of the various woods, and the presence or absence of knots in their constitution. The tools and cutters which work these many varieties must be peculiarly fitted for the woods on which they are used. Here lies a very important difference between wood and metal working machinery.

Another peculiarity of wood-working machinery is the speed at which the parts must move, and allowance must be made in the construction of the machine for the centrifugal

years." A machine must therefore be constructed rather with a view to economy than great durability.

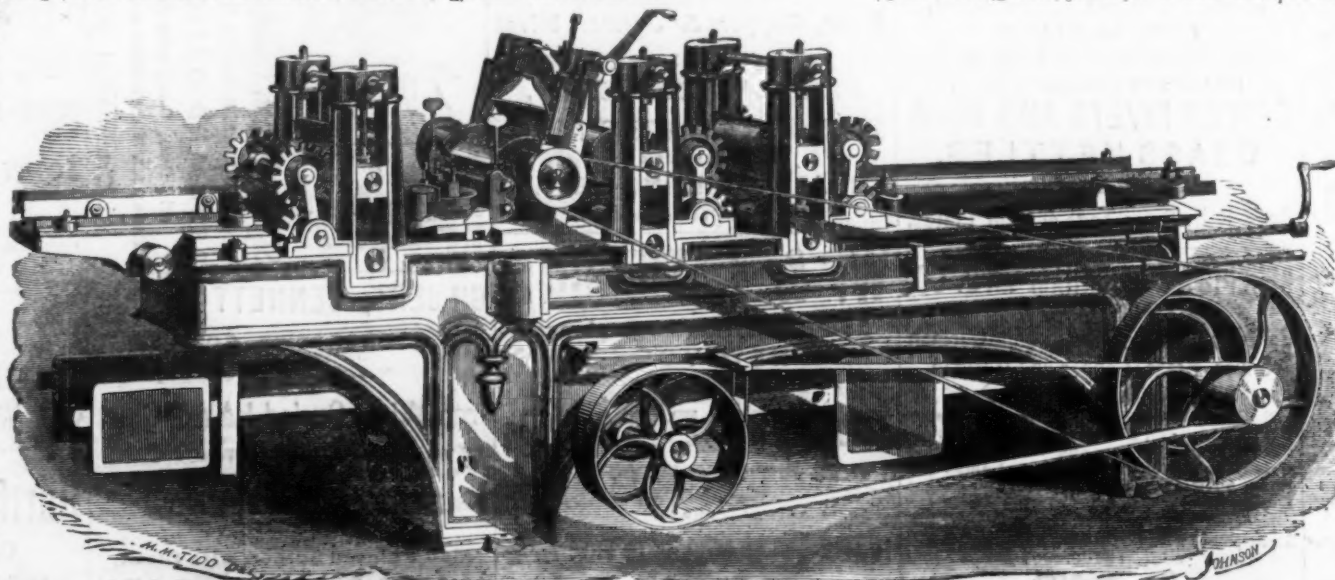
The following premises laid down by Richards, in the work previously quoted, exhibit very clearly the principles which underlie the operation of wood-working machinery:

"First—The object of machines in wood work, as contrasted with hand labor, is to augment force, to guide cutters in true lines, and secure a greater rapidity of movement.

"Second—The direct effect of machines is as the amount or length of cutting edge that can act in a given time.

"Third—This effect or result is limited by the nature of the operations, and by the accessibility of the surfaces of the material to be acted upon.

adjustment have been kept in mind. Among some of the most important improvements on this machine, may be mentioned that the feed rolls are geared at both ends, represented in a smaller engraving. The gears at each end of the feed roll are connected with rods running across the machine, and are also made fast to the frame on both sides, thus preventing any cramping of the gears. Where gears are used on only one end of the feed rolls, a lifting action is produced which causes the board to be fed through in an oblique direction. This difficulty is avoided by gearing the feed rolls at both ends, causing an equal pressure on both edges of the board, feeding it through straight; the gears wear even, and are more than twice as durable.



PLANING AND MATCHING MACHINE.

"Fourth—This limit of application governs the relation of machine to hand labor, and whenever hand manipulation approaches what can be done with machines, they should not be used, and cannot with profit be applied."

As in the case of other machines, the framing of wood machines must be disposed so as to meet the strains, to connect and support the details of the machine, and in many instances support the material also. When, however, the high speed at which such machinery is run is taken into account, in connection with the various other strains to which the machinery is subjected, the matter becomes complicated and the proper construction of the frame a difficult question. In arranging the frames of wood machines, then, it is absolutely necessary that a firm connection be secured between the cutter spindles and lumber supports. In rotary machines the requirements of symmetry usually furnish sufficient strength in most parts of the framing; but in reciprocating machines, such as sawing and mortising machines, a remarkable strength is required when the work to be performed is considered. This arises from the necessity of counteracting the effect of inertia in the reciprocating parts.

As illustrative of this branch of industry, we publish this week an engraving of the planing and matching machine manufactured by the S. A. Woods Machine Co., whose warehouses are located at 91 Liberty street, New York, and 67 Sudbury street, Boston. The larger engraving is an excellent representation of their plan-

Another of our engravings represents the hinged pressure bar, which works close to, and directly in front of, the upper cutters, and which prevents the tearing and splitting of the lumber when cross-grained, or when hard wood is worked. This pressure bar is provided with suitable weights, so that it readily yields to inequalities in the thickness of lumber. Another improvement is the double adjustment of the "matcher frames" across the machine, which enables the operator to work narrow stuff on either side of the machine, or on the center, thus using the full length of the knives. This adjustment is very simple.

The "chip breaker," or "clip," is represented in another engraving, and is hinged on the side cutter head frame, working on the same principle as the top pressure bar, which prevents all splitting of the edges of boards; and, holding the "stuff" close by the cutters, enables the machine to be fed, it is claimed, 30 per cent. faster than any other machine. The under cutter head is attached near the end of the machine, so that it is easily accessible for changing or sharpening. The table is hinged so that it can swing around, giving easy access to the under cutters. It is also provided with suitable adjustable "rest bars," or bed plates.

The machines have also a swivel guide for matching tapering lumber. This attachment can be applied to any sized machine in a strong, substantial manner; and with this attachment the machine will work stuff tapering 6 in. or more in a length of 10 ft. The bed plate, di-

plete machine for all kinds of molding work.

The surface planer manufactured by this company illustrates another department of wood machinery. It is provided with two pairs of feed rolls, the feeding-in pair being 6 inches in diameter, and furnished with the patent expansion gearing on both ends of the rolls, thereby making a strong and uniform feed. The carrying-out rolls are 4 inches in diameter, and are strongly geared. The top feed-roll is held down by means of heavily weighted levers. The stuff is also fed over a solid bed plate, and the cutter-head is provided with the hinged pressure bar above described, thus holding the lumber firmly upon the bed plate in front of the cutter. This method possesses great advantages over the lag planer, in which the constant friction and uneven wear of the lags would in a short time render a lag planer unreliable for producing smooth work and even thickness on lumber.

The Milwaukee Iron Company's Rolling Mill.

The correspondence of the Chicago *Inter-Ocean* says, respecting these works: They are situated at Bay View, a suburban village on the bay shore, near Milwaukee.

The location was well chosen. It is only 45 miles from the Iron Ridge, and deeply laden vessels can come within a few rods of the mills, while the facilities for shipping the products

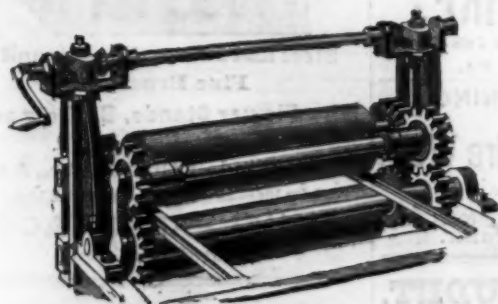
cylinder boilers, which afford the motive power to the blast and hoisting engines of the blast furnace. Beside the pig iron sold for foundry purposes, there has been made the past year 37,284 net tons of railroad iron, the value of the entire product figuring up to the round sum of \$3,000,000. 17,000 tons of old rails have been wrought over the past year at these works.

The iron made from the Iron Ridge ore is of superior value in manufacturing rails when combined with a due proportion of that from the mines of the Lake Superior country, the proportions being three-eighths of the Iron Ridge. Of the ore used 23,000 tons are brought from Escanaba in vessels direct to the company's docks, and 40,000 tons from Iron Ridge on the St. Paul Railroad direct to the works. The company owns two-fifths of the Iron Ridge mines. The balance is owned by the proprietors of the Chicago mills and those at Wyandotte, Michigan. The ores brought from the Lake Superior country are purchased at the mines near Negaunee, and shipped in vessels from Escanaba. The company thus has the advantage of being enabled to select such ores as are best adapted to the manufacture of railroad iron. A number of vessels are employed during the season of navigation in transporting this ore from Escanaba, and 140 cars are in constant use bringing ore from Iron Ridge and for use in the yards and on the dock, which is 1400 feet in length. The pile of ore now on the ground for winter use is immense, while the cars are daily bringing from Iron Ridge that which goes into immediate use. There is also piled up at the works vast piles of coal and coke for the use of the establishment. Of this there was used last year 55,000 tons of bituminous coal brought from Ohio, 25,000 tons anthracite from Pennsylvania, and 20,000 tons coke from Connellsville, Pa. The two former are brought by water and the latter by rail, obtaining cheap freight by grain vessels and stock cars on their return trips.

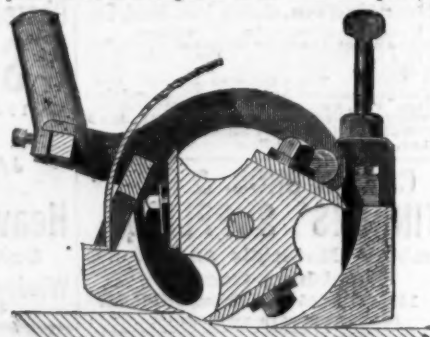
A top and bottom mill has just been completed, by the aid of which the production of rails will be increased yearly 9000 or 10,000 tons. The engine put up in this mill is of 34x36 cylinder, is a very superb one, from the works of Jackson & Wiley, Detroit. It has a forty ton fly-wheel, which makes seventy-five revolutions a minute. There are six heating furnaces, with a steam boiler to each, two more to be added in the spring; also a Stillwell heater and two pumps.

To operate these extensive works a large amount of machinery is requisite, aside from that named above, and it has been furnished chiefly by the machine shops and foundries of Milwaukee. There are in all forty-two steam boilers in the old mill; two blowing engines, operated by steam, for the blast furnaces, and there are seven pairs of shears for cutting both hot and cold iron; two trains of puddle rolls; a train for rolling rails and two for tops and bottoms; saws for cutting rails; steam hammers; six fan blowers; two Burden rotary squeezers; rail straighteners; steam punches and slotters; apparatus for cutting up old rails, and other numberless massive implements driven by steam.

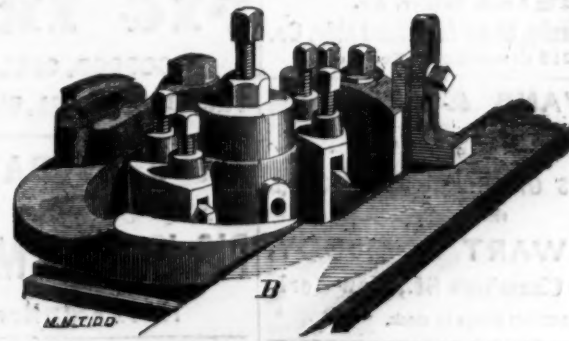
The company owning and operating this business was incorporated by charter about six years since with a capital of \$250,000, which has since increased to \$1,500,000, using beside capi-



EXPANSION GEARING AS APPLIED TO FEED ROLLS.



HINGED PRESSURE BAR AS APPLIED TO SURFACE CUTTERS.



HINGED CHIP BREAKER APPLIED TO THE TONGUING MACHINE.

strain due to this cause. The bearings must be nicely adjusted, and the journals carefully lubricated. The shaft bearings in cases of such high speed, must be also provided for with great care and nicety. Furthermore, wood-working machines must be economically constructed. The reason for this is peculiar, and rests simply in the fact that the changes and improvements in this department of machinery are so rapid that few machines are retained in manufactories for a long time. Richards, in his treatise on the construction of wood working machines, says "it can be safely asserted that there are throughout American factories but few wood machines that have been running ten

ing and matching machine, which is a most complete example of its kind. It has been the subject of nine distinct patents, the earliest bearing date April 13, 1832, and the latest March 23, 1870. Each of these patents covers some important advance on the previous construction of the machine, and it is claimed that for dressing all kinds of lumber and for performing all the various operations for which it is adapted, this machine stands pre-eminent, both in Europe and America. Seven sizes are made, with four, six and eight feed rolls. The lighter machines weigh about 5000 lbs., the heaviest about 12,000 lbs. In its construction, strength, durability, simplicity, and facility of

rectly under the upper cutter-head, is a false plate, so that it can be removed and dressed over in case it becomes worn out of true. The boxes on the top cutter head are tied together by means of a yoke extending across and underneath the bed of the machine, thus giving free access to set, reset, and sharpen the cutters. The cut, however, does not show this late improvement, being yoked across the top of the machine.

The molding machine, also manufactured by the S. A. Woods Machine Co., is also worthy of notice on account of its peculiar adaptability to the purposes for which it is designed. This machine is well adapted for car work, picture

of the mills to their destination are equally as advantageous as are those for obtaining the raw material from which they are made.

The various processes of molding into pigs, puddling, squeezing, rolling into rails, etc., are all carried on here. Nearly 1000 men are employed night and day. One of the two blast furnaces has been fired up for three consecutive years. The other has been blown out once in that time. To feed these two furnaces has required during the past year 62,000 tons of iron ore. From this material the furnaces yield 27,347 tons of pig iron. The waste gas generated in the furnaces is conducted in pipes supplying the necessary heat for ten sixty feet

tal to the amount of \$750,000 in the business. The officers are Captain E. B. Ward, president; Hon. Alexander Mitchell, treasurer, and J. J. Hagerman, Esq., secretary. The latter gentleman has been general manager of the business of the company since its organization.

The first monthly report of the progress of the St. Gothard Tunnel has just been published. At the end of December, nearly 400 feet had been pierced, and 43 feet of the masonry completed. About 60 feet of the cutting at the opening of the tunnel have also been finished. During the month of December an average of 272 men had been employed on the works.

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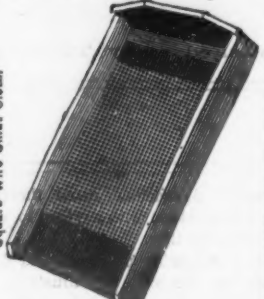
HOWARD & MORSE,

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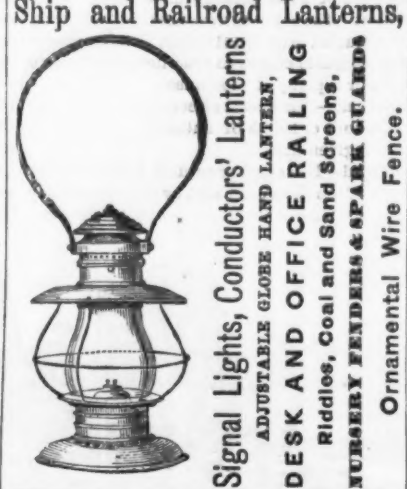
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We take from the records of the patent office at Washington the following specifications of certain patents lately issued, which will be found interesting:

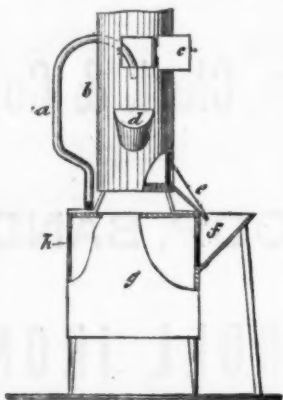
The following are abstracts of the specifications of patents 134,288 and 134,289, issued under date of December 24th, to Pierre Eymard, of St. Jean Baptiste, Canada.

IMPROVEMENT IN MANUFACTURE OF WROUGHT IRON.

The illustration is an end elevation, with parts in section, showing the arrangement of devices for conducting the melted metal from the cupola into the chamber.

The invention relates to an improved process of treating cast iron of all qualities for converting it into wrought iron; consisting in the addition of certain proportions of nitrate of soda, oxide of manganese and oxide of iron to a mass of melted cast iron, and in the employment of a blast of atmospheric air impinging on the surface of the liquid metal during the time it is being subjected to the intense chemical and mechanical action of the ingredients specified. The result is that the sulphur, phosphorus and arsenic are eliminated along with the carbon, leaving the iron in an approximately pure state, and forming a scum upon the surface of the melted iron, which, upon cooling, becomes scoria or slag. The function of the blast is mainly to separate or so act on this scum as to enable the sulphur to evaporate freely. The chemical admixture referred to consists of thirteen parts of nitrate of soda, seven parts of oxide of manganese, and four of oxide of iron.

In carrying out my invention, a furnace constructed in the usual manner is employed, except that a blast pipe, *a*, is connected with the cupola *b*, and is curved or bent downward within the same, as shown in the drawing. *c* is the door of the cupola, and *d* a trough for admitting the liquid metal into the same. *e* is a conductor or spout; *f*, a trough to receive the liquid metal from the conductor and admit it into the puddling furnace *g*. *h* is a door to draw the metal from the puddling furnace. The operation is as follows: Take three pounds of the mixture above described and place it in the cupola. Take also one hundred pounds of cast iron heated into a liquid state and let it flow through the trough *d* into the cupola. Allow the liquid cast iron to remain three or four minutes in contact with the mixture. Admit a blast through pipe *a* during the same time over or on to the surface of the liquid metal. The sulphur, the phosphorus, and the



arsenic which are contained in the cast iron are then driven away along with the carbon, leaving the iron in such a state of purity as to be equal in quality to the best Swedish wrought iron. A hole is then opened at the bottom of the cupola to allow the metal to flow through the conductor *e* into the trough *f* and from this last into the puddling furnace *g*, where the metal is puddled in the usual way. From the puddling furnace the metal is taken out through the door *h* and taken to the rollers, where it is converted into the shapes required by commerce.

Claim 1. The process of purifying cast iron by placing it, in a liquid state, in contact with a mixture of nitrate of soda, oxide of manganese, and oxide of iron in the above stated proportions, and the application of a current or blast of atmospheric air so as to free the metal of its extraneous substances.

2 The process of purifying cast iron by means of a mixture of nitrate of soda, oxide of manganese, and oxide of iron, in the respective proportions of thirteen, seven, and four pounds to one hundred pounds of iron, substantially in the manner described.

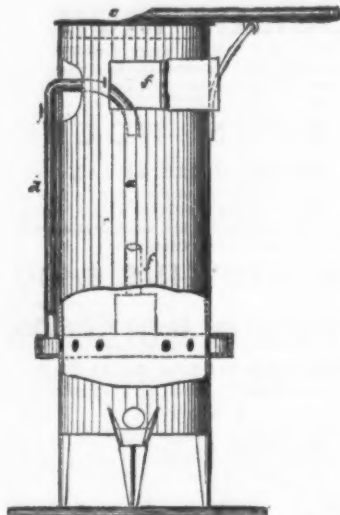
IMPROVEMENT IN THE PROCESSES OF MAKING CAST-IRON FROM ORE.

The first part of this invention relates to the combination of slag—being the residue of the burning of cast-iron with oxide of manganese, nitrate of soda, and oxide of iron—with iron ore placed in a furnace to be converted, by heating, into cast-iron. The second part relates to the employment of an air-blast pipe connected with the upper part of the furnace so as to blow down on the liquid metal the gases arising from the ore, and also exert a certain degree of atmospheric pressure on the metal.

The drawing is a partly-sectional elevation of a furnace employed in carrying out the process.

The slag is the residue of the burning of cast-iron with oxide of manganese, nitrate of soda, and oxide of iron in the proportions of ten parts of oxide of manganese, ten parts of nitrate of soda, six parts of oxide of iron. *a* is the body of a cupola. *b* is a door for introducing the slag and ore. *c* is the hinged cover for closing the cupola at the top. *d* is a pipe for admitting the air-blast in the upper part of the cupola. *f* is the ordinary blast-pipe entering the cupola at the base. The operation of converting iron ore into cast-iron is as follows:

Place a charge of coal in the cupola *a*. Over the coal place a layer of slag. On top of this layer of slag place a charge of iron ore and cover it with a layer of slag. Then for every 100 pounds of iron ore which is in the cupola add 50 pounds of cast-iron. Thus the slag and ore are regularly stratified. As soon as the whole mass of metal which is in the cupola is brought to a red heat, close the cupola at the top by letting down the cover *c*. The carbon contained in slag will then go through the ore, and the whole of the metal immediately becomes fused. At the beginning of the operation the blast of atmospheric air is forced through the pipe *f* underneath the charge of coal in the cupola in order to ignite the coal. The air of the blast is subsequently directed, by means of a cock suitably placed, into the pipe *d*, so as to bring the current on top of the charge of metal in order to keep the gases



arising from the fusion of the metal on the metal itself, and help more effectually the fusion of said metal. For accomplishing this the cupola is made air-tight by closing the cover *c*.

Claim 1. The process of producing cast-iron from native ore by means of slag derived from treating melted cast-iron with oxide of manganese, nitrate of soda, and oxide of iron in the above specified proportions.

2 The process of producing cast-iron from native ore by means of the slag above described and the employment of a blast of air delivered through a pipe, *d*, curved or bent downward within the cupola, so as to convey an air-current upon the surface of the metal subsequent to liquefaction.

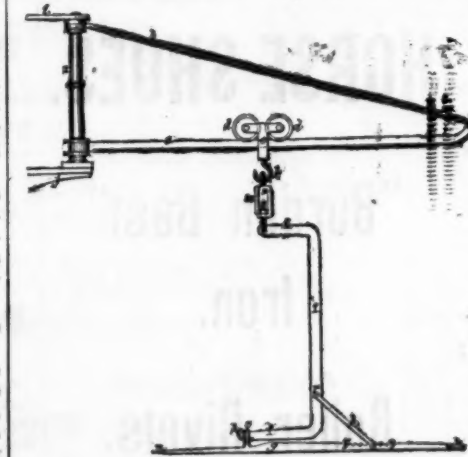
3 In combination with the cupola *a*, the pipes *d* and *f* and a suitably arranged cock for directing the air-blast, as set forth.

IMPROVEMENT IN CHARGING APPARATUS FOR IRON-HEATING FURNACES.

Specification forming part of Letters Patent No. 134,151, dated December 24, 1873, issued to William F. Maharg, of St. Louis, Missouri.

The accompanying illustration represents a side elevation of the apparatus, which is connected to or with a swinging crane, whereby a pile or charge of iron may be taken from the place where it is prepared and carried into and deposited upon the hearth of the furnace in such position as the operator may desire.

The crane, which is composed of the column or shaft *a*, horizontal arm or rail *c*, and tension rod or brace *b*, in any of the usual well-known ways, is supported in an upper and under arm or bracket, *i*, *j*, so that it may swing or turn therein. These arms or brackets *i*, *j* may be built in or attached to the corner of the furnace in the common well-known way. On the arm or rail *c* of the crane is mounted a carriage or truck, *d*, to the side straps or bars *e* of which is attached a hook, *k*, that sustains



or carries a swivel, *m*, to which is suspended a bar, *f*, the upper and under ends of which bar are so bent as to make the vertical portion thereof stand outside of the points of suspension of the arms, and thus admit the vertical portion to be brought up against the door of the furnace, for a purpose to be hereafter explained. The "peel," *g*, is flattened out at its end, *n*, so that the pile or load to be carried upon it may have proper support thereon. On the upper side of the peel there is an eye, *o*, for receiving the hook, *p*, on the end of the under arm of the bar, *f*, by which said peel is carried; and back of this eye there are ratchet-teeth, *q*, against which the free end of a brace, *h*, which is pivoted to the bar, *f*, at *r*, may take to support and steady the peel when carrying its load; and at the extreme rear end of the peel there is a handle, or grasping piece, *s*, by which the operator guides and directs the peel

and its load, and deposits the latter in any suitable place in the furnace.

The operation is as follows: The iron for the charge is prepared on a table of about the height of the peel, or furnace door. The peel is then swung around by the crane to said table, or stand, and the flat end, *n*, of the peel is passed under the pile, or charge, so as to carry and sustain it, and the brace, *h*, arranged to steady the load. The operator guiding and controlling the peel, the latter with its charge is swung by the crane around to, and the end of the peel and the pile into, the furnace, the bend, or bow, of the bar, *f*, admitting of this operation. When the pile, or charge, is in proper position the operator, by means of the peel, drops, or deposits, it in the furnace.

Claim. In combination with a swinging crane, the carriage, *d*, bar, *f*, and peel, *g*, constructed, arranged and operating as and for the purpose described and represented.

Smelting and Refining Lead and Silver Ores near St. Louis.

The St. Louis Smelting and Refining Company, having completed their extensive works at Howard Station, about five miles from the city on the line of the Missouri Pacific Railway, are now engaged in treating large quantities of silver bearing lead ores from Utah and Colorado, which are brought from the ores to the works without transshipment. The usual product of the ores received here is about one-fourth of one per cent. of silver, forty per cent. of lead, twenty-three per cent. of silica, ten per cent. of moisture, eight per cent. of carbonic acid, and the residue iron, lime, zinc, etc. These proportions vary, depending upon the mines from whence the ores come, and upon other causes peculiar to the mining districts. Ore with the per cent. of silver mentioned above, and the class most frequently obtained by this company, produces about \$100 worth of silver to the ton, beside the lead. Taking the freightage and cost of ore from this, and the margin for smelting and refining is found.

After the constituents of the ore are specifically ascertained, it is carried up stairs convenient to the charging door of the furnace. Here it is first spread in alternate layers of flux and ore and coke, which is the fuel exclusively used for this reduction. The flux consists of slag and mill clinders, which renders the smelting more thorough and rapid. After being carefully mixed in the desired proportions, the charge is made in suitable time; each consisting of several hundred pounds of ore and other substances, is put into the furnace and subjected to the most intense heat. This operation is continually carried on, the blast being applied uninterruptedly, and the company are now smelting about twenty tons per day, making a draw of lead and silver in combination, of one to one and one-fourth tons every three or four hours. The slag is drawn off continually into iron pots, which are wheeled away in the shape of half eggs, to be rebroken and utilized over and over again in future charges, where it is used to great advantage in preventing the ore from lying too compactly in the furnace, and for other chemical purposes. The company are now building two additional furnaces—a smelting and a roasting furnace—about thirty tons capacity to each.

The furnace used by these works is a Pils blast furnace, 25 feet high and 3½ feet in diameter, and has proved itself to be a most excellent one. It is 15 feet high from the tuyeres to the feed hole, 3½ feet in diameter at the tuyeres, and 18 inches in thickness of walls. There are three tuyeres with 1½ inch nozzles. The slag discharge is about 10 inches below the tuyeres. Blast is furnished from the Studevant's blowers. They have been worked up to a pressure of one inch of mercury, but the usual pressure is one-half inch quicksilver height. Power is provided by a 25 horse-power engine, and the water required for many purposes is forced by a pump, from the River Des Peres, a considerable distance away.

The desilverizing of the pigs of combined lead and silver is effected in a cupel frame, where by certain operations the lead is oxidized or converted into litharge, leaving the silver deposited in what is called the test bottom as pure as it can be rendered, or 99.08 per cent. This cupel is only used for the "rich" lead. The poorest is put into kettles, mixed with zinc and desilverized—the gold and silver floating on the top when in a molten state, and the baser metals being precipitated. The precious metals are skimmed off and put into smaller kettles, the lead remaining.

The chemical agent in effecting the separation of the gold, silver and copper from the lead is zinc, which has a greater affinity for gold and copper than silver, and a greater affinity for the latter metal than lead. This quality of zinc led to the

adoption of the plan of charging the tanks of boiling crude metal three times, the amount of each charge being graduated according to the percentage of pure metal to be taken up, by this means effecting a near approximation to a separation of the gold and copper from the silver at the first operation. The large iron vats are three in number, and one of them, that in which the crude bullion is first melted, has a capacity of twenty-four tons. They are set in a massive structure of brick, raised so as to economize labor in handling the metal, and are heated by flues from furnaces underneath.

After the metal is sufficiently molten, the first charge of zinc is added, and well stirred for half an hour, and then the mass is allowed to rest for three hours, during which time the alloy of gold, copper, and a small percentage of silver comes to the surface, when it is skimmed

off and transferred to one of the three smaller vats immediately adjoining. A second similar operation, but with a large charge of zinc, takes from the lead all of the silver it contains, except a mere trace. The third charge seems to be intended principally to prove the thoroughness of the two first operations. At the conclusion of these processes the lead has attained a high degree of purity, but is subjected to another and higher refining. From the bottom of each vat an iron pipe leads to a reverberatory furnace, and through this the lead runs into the bath of the furnace, where it is subjected to a bright red heat for two and a half hours, by which time all of its base constituents are eliminated by oxidation, or, having formed a fused scum on the surface of the pure metal, are skimmed off. This is said to be the purest lead known to commerce, only carrying two pennyweights of silver to the ton, and being absolutely free from base alloy.

The company are reported as having made a business success from the outset, owing partly to good management and partly to the advantages of the location chosen.

The Antiquity of Trade Unions.

Trade unions are not of such recent origin as many people suppose. "I am credibly informed," wrote Mandeville, the author of the *Fables of the Bees*, one hundred and fifty years ago, in his "Essay on Charity and Charity Schools," "that a parcel of footmen are arrived at that height of insolence as to have entered into a society together, and made laws by which they oblige themselves not to serve for less than such a sum, nor carry burdens, or any bundle or parcel above a certain weight, not exceeding two or three pounds, with other regulations directly opposite to the interest of those they serve, and altogether destructive to the use they were designed for. If any of them be turned away for strictly adhering to the orders of this honorable corporation, he is taken care of till another service is provided for him; but there is no money wanting at any time to commence and maintain a lawsuit against any master that shall pretend to strike or offer any other injury to his gentleman footman, contrary to the statutes of their society. If this be true, as I believe it is, and they are suffered to go on in consulting and providing for their own ease and convenience any further, we may expect quickly to see the French comedy, 'Le Maître le Valet,' acted in good earnest in most families; while, if not redressed in a little time, and these footmen increase their company to the number it is possible they may, as well as assemble when they please with impunity, it will be in their power to make a tragedy of it whenever they have a mind to."

New Iron Enterprise at Chattanooga, Tenn.—The Chattanooga Times says A petition has been, or will be soon, filed with the Chancery Court of this county, praying for the organization of a stock company, with a capital of \$500,000, to be known as the Chattanooga Foundry and Machine Works, Mining and Manufacturing Company. The incorporators are Julius E. Rahl, of Cleveland, the manager of the Ducktown Copper Mines, and Thos. Webster, S. M. Winchester, Gen. J. T. Wilder, H. S. Chamberlain, John L. Divine, E. G. Eaton and J. W. Webster, all of this city. The company when organized will purchase from Mr. Webster his extensive foundry and machine works, and manufacture all kinds of casting and machinery on a large scale. It is also proposed to erect a blast furnace in or near the city, in which they will make their own iron, securing the quality desired by a judicious mixture of ores, of which nearly every variety can be obtained within a radius of one hundred miles. It is also contemplated to build a narrow gauge railroad, about ten miles long, to Walden's ridge, for the purpose of bringing coal to this city for their own use and to supply the community. It seems to us that this company will be successful. In fact, with such men as are named as the incorporators to manage its affairs, we do not see how it can fail of the most brilliant success. A blast furnace in or near this city, making good iron, will in itself be worth a fortune. Our iron men are now suffering from an iron famine with no immediate prospect of relief. The Shelby furnace, which supplies most of our best foundry iron, has been in blast two years continuously, and the boshes are so much worn that it will soon have to go out of blast for repairs. The new company will be organized as soon as they can secure their charter from the Chancery Court, and we hope they will commence the erection of their blast furnace and the construction of their narrow gauge coal railroad at once.

The Iron Ore Prospects.—The statement has frequently been made that the shipments of iron ore from the Lake Superior mines this year will reach enormous figures. According to estimates made last fall 800,000 tons were to be shipped from Escanaba alone, and adding the probable shipments from Marquette and L'Anse, and possibly from Ashland, the grand total of shipments from the Lake Superior mines this year were to reach nearly, if not quite, a million and a half of tons, against about 900,000 tons last year. However, the present prospects do not warrant any such conclusion. The iron markets are falling, and if the present tightness in the money market continues, the demand for iron must decrease, and the prices still further decline. Mr. S. B. Burt, of Marquette, who has been "outside" attending a convention of iron men, passed north on Saturday, and gives us the following figures as the prices demanded for ore delivered in Cleveland, by the mine owners: No. 1 specular, \$12; No. 2 specular, \$9; No. 1 magnetic, \$11.50; hematite, \$9. These prices are far in advance of those the iron manufacturers are willing to pay, and neither party show any inclination to change their views; so there is a consequent dead lock. Of the whole prospective

product there have been but about 300,000 tons entered upon as sold, and this not at any stated figure, but at "the market price." In order to get out anything like the amount of ore estimated last fall to be shipped this year, a heavy force in the mines would be required this winter; but, on the contrary, those mines being worked this winter are run very light, the owners not being willing to take the risks of the market. From this we infer that the estimated product for this year is too high, and that in reality it will not be very much in excess of last year.—Green Bay Advocate.

A New Weighing Machine.—The Sheffield Independent says: Until recently a ready means of ascertaining the correct weight of heavy goods has been one of the "good things to come." The difficulty hitherto experienced, however, has been entirely overcome by an invention known as "Duckham's patent," Mr. Duckham being an engineer at one of the London docks. The invention underwent a very severe test a few days since in weighing some of the armor plates at the Atlas Works, and the result was eminently satisfactory. The machine used on that occasion was one of 10 ton capacity, but they are made up to a capacity of 100 tons. It was so small that it occupied but one cubic foot of space, and so light that a strong lad could carry it and apply it for use. The machine is but an iron cylinder charged with oil, and fitted with a piston and a pressure gauge, the latter resembling the gauge commonly in use in connection with steam boilers. On its being attached to the crane block, some armor plates were raised by being connected with its piston rod, and the instant they left the ground their weight was accurately indicated on the dial. We understand the machine has been introduced into other large works in the neighborhood with considerable success; and judging from the favorable impression which the tests at the Atlas Works created, there can be no doubt it will soon be extensively adopted not only in iron works and collieries, but wherever goods are handled or dealt in by weight. The machine has been adopted by the English, Spanish, Russian and Brazilian governments; and so large has the demand become for it that a company with extensive plant and works has been formed to undertake the manufacture.

The Pipe Foundry Trade at Glasgow.—This branch of business has, during recent years, been one of great magnitude in Glasgow, but there is reason to fear that the extravagant prices which are at present being quoted for Scotch pig iron may permanently injure it. Very few contracts of any importance are being closed with Glasgow iron founders. Tenders have recently been taken, through a Glasgow mercantile house, from several of the principal pipe founders for between two and three thousand tons cast iron water pipes for the city of Ottawa, and for between three and four thousand tons for the city of Toronto; but there is no confident expectation that orders will be received, in the mean time at all events, to proceed with the execution of the work, as the prices which are quoted are about 65 per cent. higher than was paid for an order of 3000 tons of similar goods executed in this city a twelve-month ago, through the same mercantile house, for the Water Commissioners of the city of St. John, New Brunswick.

The London Times states that a rotary puddling furnace, invented by Mr. Crampton, is shortly to be tried at the royal gun factories, Royal Arsenal, Woolwich. The peculiarities of this furnace are in the fact of the heating and puddling chambers being combined in one, unlike other rotary furnaces in which they are merely connected, and in the provision which is made for supplying the fuel in a pulverized state. There is in connection with the furnace a set of grinding gear and other apparatus complete, by which the fuel, which has simply to be thrown into a hopper, is carried by elevation to the stones, where it is pulverized into an almost impalpable powder, passed through a screen to insure uniformity in the size of the particles, and is then carried on to a blast pipe, and blown into the furnace in such quantities as may be required, the supply being regulated by a valve. The body of the furnace is formed of double plates, and between them there is a continuous flow of cold water, for the purpose of keeping the outside cool and protecting the inner lining, which has hitherto been the great difficulty with furnaces of this class.

Silvering Glass.—The process employed by R. Siemens, and described in the *Archiv der Pharmacie*, is as follows: Aldehyde ammonia is first made by conducting dry ammonia gas through aldehyde. The aldehyde ammonia and the nitrate of silver are dissolved separately in distilled water, and the solutions mixed and filtered. The proportions used are: 4 grammes nitrate of silver, and 2½ grammes aldehyde ammonia, to one litre of water. The object to be silvered is first rinsed with a solution of soda, then with alcohol, and lastly, with distilled water. When thoroughly clear, it is filled with the above solution and suspended in a water bath. The bath is heated gradually, and as soon as the temperature of 123° F. is reached, the silver mirror begins to form, which is completed at a temperature of about 130° to 140° F. At first the coating looks black, but as it grows thicker it acquires more lustre, and finally forms a beautiful silver surface. When this has taken place, the object is removed from the water bath. It can now be rinsed out with distilled water and allowed to dry.

A block of native copper, weighing nearly 105 pounds, was recently found in Leland township, Grand Traverse county, Michigan. As the locality is several miles distant from any known copper mines, the discovery excites considerable attention.

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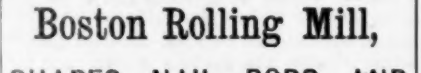
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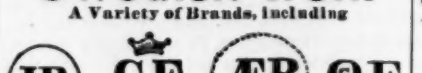
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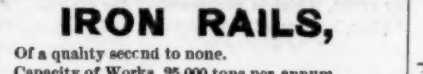
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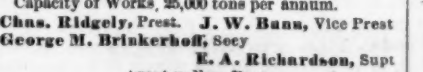
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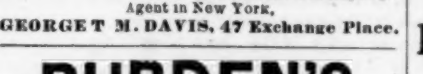
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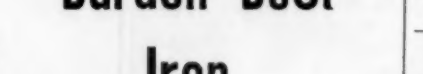


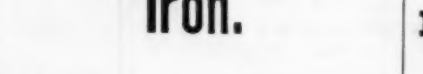




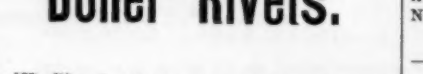


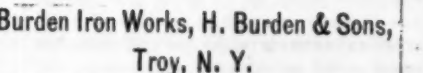


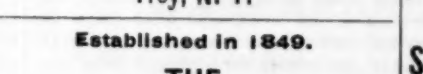


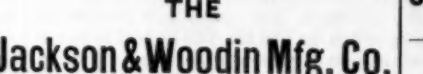


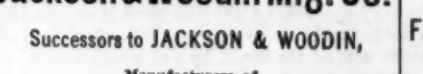


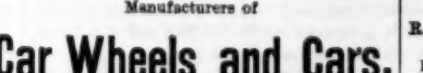


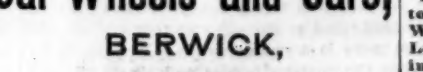


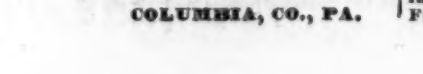


















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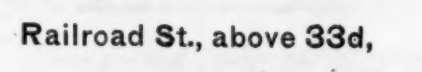
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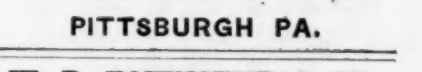
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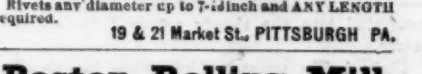
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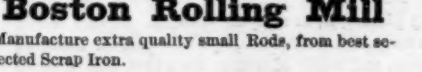


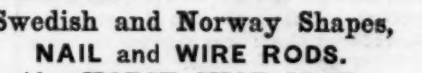


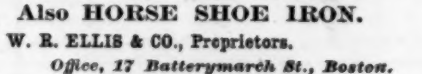


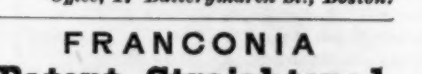


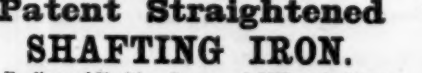


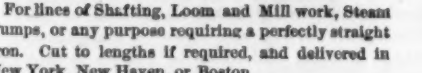


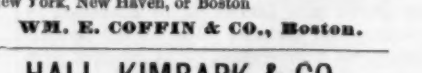




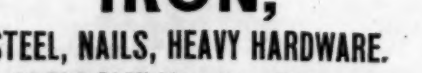








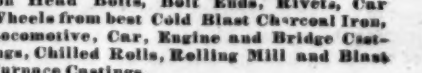


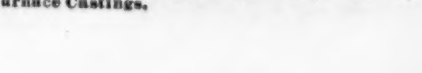


















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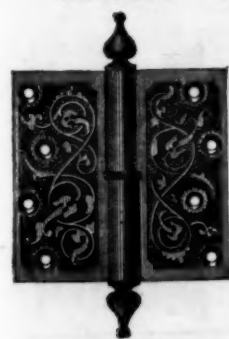
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Curiosities of Coal.

BY JAMES A. WHITNEY, M. E.

Since Lord Dudley's experiments with pit coal in iron manufacture, the mining, preparation and use of this fuel has been the promoting cause of a heavy percentage of English inventions. Recently, some investigations, necessary from an expert's standpoint, brought to my notice a number of curious examples among the earlier alleged improvements, and some of these I purpose to embody in the present writing. I will speak here only of bituminous coal, but other forms, anthracite, lignite, etc., have secured equal attention, have provoked quite as many plans of alleged novelty and usefulness, and have cost to the full as much outlay as the other.

Going back to the, in the arts, remote date of 1824, we find that on February 28th of that year, one Thomas Harper patented one of the earlier methods of avoiding the celebrated smoke nuisance, which arose from the difficulty of wholly consuming the minute particles from bituminous coal, and which was finally "put down by act of parliament." He proposed, "for the general purposes of fuel," to mechanically mingle ordinary bituminous coal with stone coal, culm or anthracite, presumably to diminish the proportion of smoke evolved to the point at which the whole could be burned up by the flame, rendered brighter by the non-smoking material. The proportion of bituminous coal was, however, rather too small to render the method of much avail where the soft coal was plenty and cheap, and the stone or anthracite more costly, the percentage of bituminous being from one-twelfth to one-fifth of the whole. It was specifically set forth that "the stone coal may be either employed in the usual form or mixed with the small or culm thereof, about one-half of each, such proportions varying according to the draft or windage" of the furnace.

Fourteen years later, one Thomas Joyce conceived the happy idea of arranging a reservoir within a stove, in such a way that as fast as the fuel in the forepart burned away, a fresh supply came down from the reservoir. As English patents have been sometimes granted on inventions previously known, it is possible that that plan had an earlier inception, but so far as I know this was the first example of a type of cylinder stove now in almost universal use and favor in this country. The abridged specification of the patent, dated May 5, 1838, describes the improvement in this wise:

"Certain improved modes of applying prepared fuel to the purposes of generating steam and evaporating fluids. The fuel to be used in these furnaces may be coke or wood, coal, charcoal or other fuel prepared, chopped or broken into small pieces so as to insure its falling down the fuel chamber, as the lower part of the fuel is consumed. The combustion chamber consists of a vertical chamber with a grate and apertures, to support combustion at the bottom. It is filled with fuel which only burns at the lower part, the upper part falling down as the lower burns away, the flame and smoke pass out through side passages surrounded by water in the boilers."

The above affords an example of how a device thought of for one purpose may find its general use in another, for the steam boiler made as just specified is nowhere to be seen while the salient feature of the invention is nowadays embodied in the stoves that heat our parlors. A parallel case is found in the invention of Robert Walker, patented Dec., 1844, for riddling coals. This comprised a cylinder formed of longitudinal bars, with interspaces of suitable width. This cylinder being placed in an inclined position, and the broken coal being fed in at the upper end, the smallest pieces fell through the spaces, while the larger passed on to the lower end and fell out on a heap. This is the system of riddling now used abroad for assorting the broken stone from a Blake stone-breaker. Walker provided friction wheels, upon which rested the peripheries of the cylinder ends—a method of relieving the axial shaft that might in some cases be advantageously applied to the cylinders used in the treatment of paper stock with alkalies.

While on the subject of coal riddling, I may mention the project of Charles Cowper, whose patent bears date Nov. 2, 1849. An endless system of buckets lifted the coal and threw it upon an inclined series of perforated plates. The larger fragments passed on and finally off; but the finer falling through the holes in the plates, fell upon a rocking sifter, up through which water was intermittently forced to carry off the stones, the specific gravity of the latter being different from that of the coal.

The same patent—for an English patent may be made to include a pretty comprehensive subject matter—sets forth a mode of compacting the finer portions for use as fuel by means of tar. The culm and tar are to be placed in a pug mill and thoroughly mixed together. The mass during this operation was to be kept hot by hot air passed into the hollow axial shaft of the mill, and also into a jacket surrounding the latter.

It is difficult to speak of many departments of arts and industry without bringing in the name of Henry Bessemer before the article is completed. It is so in the present instance, and the prominent points of one of Bessemer's patents, granted in 1849, is worthy of mention with reference to the matter in hand. This comprised—I quote the abridged specification: "Heating small coal so as to soften the same, and pressing it into molds so as to solidify and press it into solid blocks, by letting it fall from a hopper with a regulating roller into a flue through which the heat from a furnace passes." The material was to be carried through the flue on a system of iron plates linked together to form an endless apron, and supported and operated by suitable drums or rollers. A piston finally forced the mass in portions through an orifice, and separated it into blocks of size suitable for

use as fuel. His description also explained the use of different kinds of coal in combination to form a fuel of any desired character; also the elimination of a portion of the volatile constituents of the coal before the treatment mentioned; also, the employment of steam to soften the material; also, the use of a partial vacuum in the elimination of any desired portion of the volatile matter by distillation. He also claimed avoiding the formation of smoke in furnaces by causing the coal to move with a regular motion from front to back of the fire-box. But the apparatus devised for the purpose appears to have been clumsy in the extreme, consisting of wheels lapping into each other in such manner as to present a closed surface for the support of the coal—a mechanism that would warp and twist out of all shape from the effects of the high heat in a very little while.

The Cooper Union Art School for Women.

The visitor to the art classes of the Cooper Union is impressed with three things—the enlightened liberality which prompted the venerable Mr. Peter Cooper to found and maintain the institution; the great and practical benefits which the lady pupils are deriving from the instruction they receive; and the interest they feel in their studies, of which proof is found in the rapidity with which they attain a high average of excellence in the several branches of art to which they devote their attention.

The school is divided into several departments, each of which is under the care of an experienced teacher, who not only understands fully the subjects taught, but seems to be impressed with the fact that the object of free instruction in an institution of this character is not so much to make artists as to prepare the pupil for the practice of some useful branch of art by which, if need be, they can support themselves comfortably wherever they may be. In former years there was rather more of theory than of practice in the instruction given. This year a better system is followed, and the results attained are most creditable to both teachers and pupils. In some of the departments the pupils are earning good wages, being allowed to bring their own work, for which they have received orders, and receiving instruction in executing it. Every encouragement and assistance is given to those who wish to turn their knowledge to immediate account, and no young woman of courage, ability and talent need leave the school unprepared to earn a comfortable support in any city of the civilized world. The philanthropy which creates such an institution is worth more in a year than all the sentimental benevolence of a century.

THE ART SCHOOL.

is under the charge of Mrs. Carter, as principal, a lady of excellent talent, and possessing the rare ability of imparting to beginners correct ideas of the fundamental principles of art which are at first perceived, rather than understood. In the elementary class, instructed by Miss Powell, the pupils begin by drawing from plaster models—simple designs, from which they gain a knowledge of form, as expressed in lights and shades, rather than in outlines. No better practice can be had than this, and from a glance at the sketches and more or less finished drawings upon the easels of the pupils, many of which show high skill and true artistic feeling, the visitor perceives that the pupils are under good instruction, and that they are inspired to effort by the hope of success. The

ADVANCED CLASS IN DRAWING

is under the charge of Prof. Venino, who instructs the pupils in more difficult studies—figure drawing and the like, in which casts of the finest classic statuary are taken as models. Much of the work done in this department is of superior excellence—better work, indeed, in some instances, than many artists of reputation could do. The particular excellence of the system of instruction followed in these departments consists in the fact that the pupils are never permitted to hide defects of drawing under the cover of careful and beautiful finish. The drawing must be correct, the expression of a face, or the position and character of a figure, must be caught and expressed in the picture, and one is surprised at the facility with which young women in the first or second year of the course will draw from such difficult models as the "Gladiator," "Hercules," "Proserpine," and "The Laocoon." From the drawing classes, pupils taking the full course are advanced to

THE CLASS IN PAINTING,

under the charge of Professor Carl Hecker, an artist of talent, but especially adapted for the position he fills in this excellent school, because of his firm faith in the superiority of the practical over the ideal in the instruction of pupils who wish to turn the knowledge they gain to account. Prof. Hecker is too thoroughly a German, and too much imbued with German poetry and philosophy, not to love the ideal in art for its own sake; but his advice to his pupils is to learn something useful first—something they can find a market for anywhere, and upon which they can depend—and then study art in its higher forms if they choose. When we remember that many of our best artists, whose names are known throughout the country, depend for a living more upon drawing for newspaper and book publishers, than upon the sale of their paintings, it is evident that this advice is the best which could be given under the circumstances.

Connected with this department is a class in portrait painting, in which the studies are from life, having special reference to coloring and finishing photographs. Other pupils devote their attention to the retouching of negatives, and still others to photographing in its various branches, all of which Professor Hecker understands thoroughly and takes a great interest in teaching. Much of the work done in these departments is equal to that done in our best photograph galleries, and many of the

pupils in coloring are regularly engaged upon work for which they are well paid by photographers who keep them supplied with orders. Much of the success which attends the labors of Professor Hecker is due to the fact that the views of the other teachers are in perfect sympathy with his own regarding the proper method of instruction to be followed; and that, when the pupils come to him, they have a thorough knowledge of drawing and a correct understanding of the elementary principles of art. Under these circumstances instruction in painting is a task attended with few difficulties and, to a teacher who loves his art, a pleasure. Instruction is given in all branches of oil painting, and the pupils are making good progress. The

CLASS IN ENGRAVING

is under the charge of Miss Cogswell, a lady of taste and experience. The course of instruction comprises drawing and engraving on wood, and much of the work done by the pupils is ordered by publishers of books and illustrated newspapers. The work done by the pupils will compare favorably with the average work of journeymen engravers, and in designing many of them display excellent taste and judgment which promise to make them more than ordinarily successful in the practice of their profession.

At the present time there are about 200 pupils in regular attendance in the several classes. On Fridays visitors are admitted to all the departments, and if our wealthy and benevolent citizens would more generally avail themselves of this privilege there would, we think, be a more general disposition to follow the good example of Mr. Cooper in providing facilities for the education of young men and women who are willing to be taught some useful art or profession. The best kind of benevolence is that which enables those who need help to help themselves, and in no way can wealth be better employed than in fitting young men and young women—especially the latter—for the practice of some useful profession.

Overtaxation of Manufacturing Enterprises in Pennsylvania.

The following circular letter, presented at a recent meeting of manufacturers in Pittsburgh, will be sent to members of the Pennsylvania Legislature:

IRON ASSOCIATION ROOMS,

PITTSBURGH, February 18, 1873.

DEAR SIR: As representatives of the industrial associations of Western Pennsylvania, in convention met, to take measures looking to a modification of the present tax laws of the State, we desire to make a personal appeal to you for your aid and influence in our behalf. Our object is to secure a repeal or modification of the present tax system, so as to relieve ourselves from the great burdens imposed by it.

You cannot be unaware that a movement of no little importance is on foot throughout the whole Commonwealth, looking toward the accomplishment of the end we seek. Such movement, we assure you, does not originate in any class or organization, but is the natural result of an evil which has made itself apparent to all corporations subject to these burdensome taxes. The tax laws are, in our judgment, oppressing the wealth of the State; they are injurious to her best interests; they discourage labor; they drive away capital; they encourage dishonesty, and will lessen, we firmly believe, in the long run, the revenues of the State. They are unjust, unequal, and in contrast with the laws of other States, liberal in a marked degree.

Is there any good reason why they should be continued?

The question is confidently asked, in the belief that none but a negative reply can be made. The messages of our governors, the press of the State, the theory of social scientists and, above all, our own experience, all suggest such reply; and we now urge upon you as custodians of the public interest and guardians of the Commonwealth, to exert your influence toward moving into the organic law of the State a just and equitable provision for the protection of the interests of industrial corporations.

The people will sustain you in so doing. As your constituents we respectfully urge you to take in hand this subject, and, as your constituents, we do so with confidence in the belief that our interests are matters of thought and moment with you. We would respectfully suggest that some movement be inaugurated at this present session, which shall test the sense of the legislature as to the merits of our claim. Such movement will at least elicit the arguments for and against our claims, and if ever that be done we do not fear the result of an honest and conscientious action upon the question.

We shall watch your course on this matter with interest. Very respectfully yours,

The above letter was signed by the following named gentlemen:

G. W. BATCHELOR,

Eagle Cotton Company.

GEORGE C. McMURTRY,

Standard Nut Factory.

JOHN SCOTT,

Mansfield Coal and Coke Company.

American Iron Bridges.—The method of making all the parts of a bridge to fit exactly, and securing the ties by pins, is peculiarly American. The plan still followed in Europe is that of using rivets, which makes the erection of a bridge take much more time, and cost, consequently, much more. A riveted lattice bridge one hundred and sixty feet in span would require ten or twelve days for its erection, while one of the Phoenixville bridges of this size has been erected in eight and a half hours, in consequence of this method of working. The American iron bridges are lighter than those of other nations, but their absolute strength is as great, since the weight which is saved is all dead weight, and not necessary to the solidity of the structure.

A short time since ten acres of property near Pompton Plains were purchased by a Pennsylvania company for \$3000. The company has opened a vein of iron ore seven feet wide, 50 per cent. pure iron. In the spring the working force will be increased, machinery put up and houses built. The ore is shipped on the Midland Railroad and taken to the company's works in Pennsylvania for smelting.

Smith & Wesson have concluded with the Russian government a duplicate contract, and will at once commence the manufacture of 200,000 more revolvers for the Russian army.

Iron.

**Atwater, Wheeler
& Co.,**

New Haven, Conn.,

IRON MERCHANTS

AND

Manufacturers.

Manufacture in their New Haven Mill, or import through their Liverpool House, all grades of

Merchant Iron

ALSO

Scrap Iron,**Wire Rods,****Tin Plate, &c.**

And invite correspondence with close buyers in all parts of the country.

Freight from New Haven to all points West and South same as from New York.

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Cleveland Rolling Mill Company,

MANUFACTURERS OF
BESSEMER STEEL RAILS,
Steel Plates and Forgings, Railroad Iron, Merchant Bar, Beams, Girders, Splices, Bolts, Spikes, &c., &c.
Office, Nos. 99 & 101 Water St., CLEVELAND, O.
A. B. SWAN, Pres. H. CHISHOLM, V. P. & Gen. Supt.
E. B. PAGE, Sec'y.

Cleveland, Brown & Co.

IMPORTERS, MANUFACTURERS AND DEALERS IN

IRON AND STEEL,

HORSE SHOES, HORSE NAILS,

NORWAY NAIL RODS,

NAILS, SPIKES,

"Standard Taper" Axles & Swedes Iron.

WINDOW GLASS.

Wrought Iron Pipe and Boiler Tubes

Chains, Rivets, Nuts, Washers, and Heavy

Hardware Generally.

25, 27, 29 & 31 Merwin Street,

CLEVELAND, OHIO.

ENTERPRISE IRON WORKS.**Cartwright, McCurdy & Co.**

MANUFACTURERS OF

Cotton Tie, Trunk & Woodenware

HOOP IRON,

Band, Scroll and Bar Iron.

General Office & Warehouse, CLEVELAND, O.

Works at Youngstown, O.

Niles Iron Co.,

Manufacturers of

Bar & Sheet Iron,**NILES, OHIO.**

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Iron and Nail Works Company,

RICHMOND, VA.,

R. E. BLANKENSHIP, Commercial Agent,

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NAILS AND BAR IRON,

Bands, Scrolls, Horse Shoe Bars, Nut and

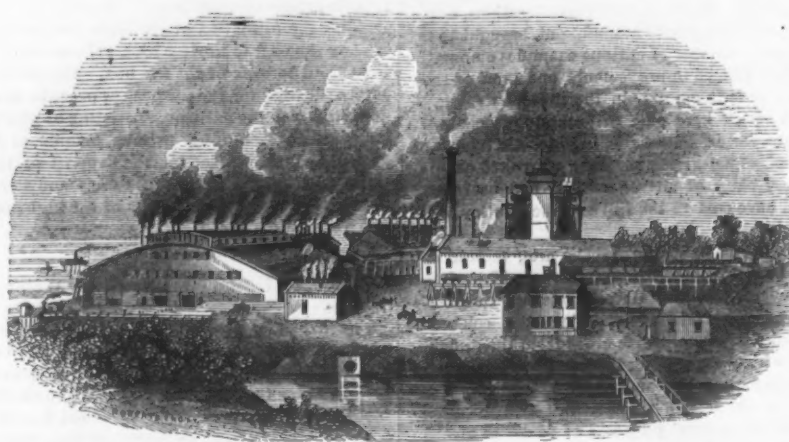
Rivet Iron, Spike Rods, Shafting, Bridge

Bolts, (Ovals, Half Ovals, Half Rounds, &c.)

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**RAILROAD IRON**

of Unsurpassed Excellence.

Capacity of Works, 45,000 Tons of Rails per Annum.

E. B. WARD, Pres. ALEX. MITCHELL, Treas. J. J. HAGERMAN, Sec'y. & Agent.

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**Iron and Steel T and
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Of Best American and English Makes.
**CHAIRS, SPIKES, FISH BARS,
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Muck Bars, OLD RAILS, Scrap,
BLOOMS.

American and Scotch
PIG IRON, AND METALS.
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This Company, by mining the raw materials and manufacturing the pig metal from a mixture of the most suitable ores in their own blast furnaces, situated on both sides of the Allegheny mountains, are enabled to obtain the various kinds of iron best adapted for the different parts of a rail. Doing their own machine work and repairs, and rolling the rail way bars with the latest improved machinery they produce

RAILS

of an unsurpassed excellence of quality at the lowest market rates. The long experience of the present managers of the Company, and the enviable reputation they have established for "CAMBRIA RAILS," are deemed a sufficient guarantee that purchasers can, at all times, depend upon receiving rails unsurpassed for strength and wear by any others of American or foreign make. Any of the usual patterns of iron rails can be supplied on short notice, and new patterns of desirable weight or design will be made to order. The Company are also preparing to manufacture Steel Rails by the Pneumatic process. Address

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Malleable Iron Castings, either from Cupola or Air

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CURVED, STRAIGHT AND HIPPED**Wrought Iron Roof Trusses****BEAMS, GIRDERS, AND JOISTS,**

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curved to template, largely used in the construction of

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Plans and Specifications furnished. Ad-

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PIG IRON—Scotch and American,**Ingot Copper, Spelter, Nickel,****AND METALS GENERALLY.****OLD RAILS, SCRAP IRON, &c**

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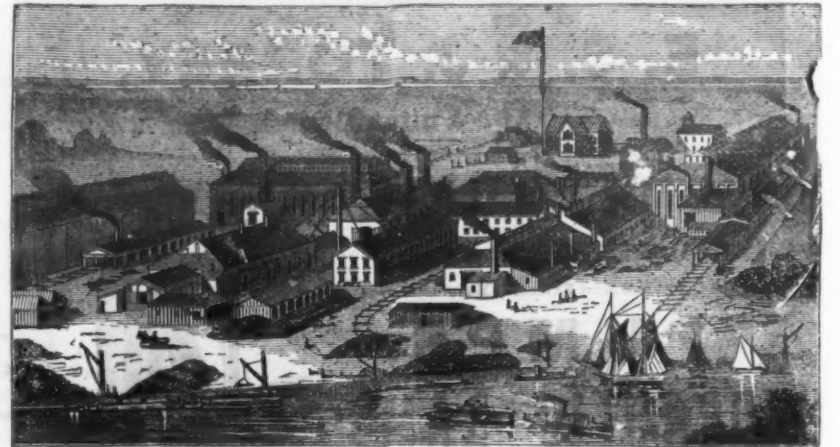
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Engineers, Contractors and Manufacturers of Gas Apparatus.

And all the

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Plans, Drawings, and Specifications promptly furnished.

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CAST IRON STREET MAINS, for Water and Gas, from One and a Half Inches to

FORTY-EIGHT Inches in Diameter.

Stop Valves (all sizes), FIRE HYDRANTS, HEATING PIPES, BRANCHES, BENDS, TEES

CASTINGS of any form or size required.

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PROPRIETORS OF THE

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POTTSVILLE, PENNSYLVANIA.

Having introduced New and Improved Machinery into their Rolling Mills, and manufacturing all their

Iron from the ore, and also doing all Machine Work and Repairs in their own shops, they are enabled to

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RAILROAD IRON

Of uniform quality, unsurpassed for strength and wear, and of any required length.

Address the Proprietors, Pottsville, Pa.

The Britannia Ironworks Company, Limited,

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MANUFACTURERS OF

ALL DESCRIPTIONS OF IRON RAILS,

Surplus Stocks of Various Sections always on hand.

London Office: W. G. FOSSICK, 6 Laurence Pountney Hill, E. C.

Weekly Output, One Thousand Tons.

NEW HAVEN**Rolling Mill Comp'y**

Manufacturers of Merchant, Horse Shoe, and extra

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Special orders taken for common Iron.

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BONNELL, BOTSFORD & CO.,

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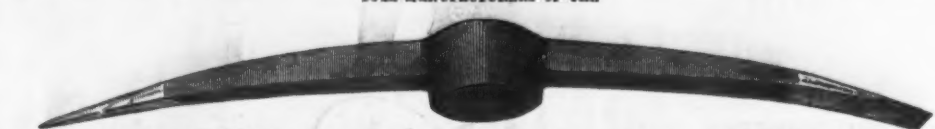
NAILS and SPIKES,

Gas Pipe, Nuts and Washers, Carriage Bolts,

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Celebrated "Washoe" Rail Road and Mining Picks,

Including all other adze eye tools. First premium was awarded by the American Institute Fair in 1868, to this Company.



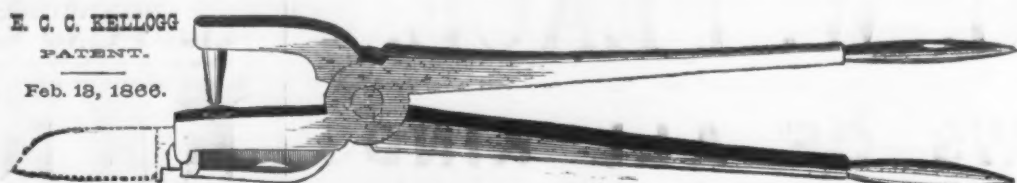
Have constantly on hand a large supply of COAL, RAIL ROAD AND CALIFORNIA OR MINERS' PICKS. We claim that OUR PRICES ARE LOWER and our picks are SUPERIOR to any thing in this country.

Liberal discount to large dealers. Send for price list.

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E. C. C. KELLOGG
PATENT.
Feb. 18, 1866.



COMBINATION BELT PUNCH,

Pronounced by those who have used them the handiest and most desirable tool in use of its kind. As will be seen, the combination consists of

BELT PUNCH, KNIFE AND AWL,

Also, Needle for Lacing Rubber Belting, so combined that each tool does its specific work and not interfere with either of the others.

E. C. C. KELLOGG & CO., Hartford, Conn.

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NELSON TOOL WORKS,

157 East 32d Street, N. Y.,

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Mining & Paving Tools,
H. Nelson's Solid Eyed Pick,
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Masons' Peen & Scabbling Hammers,
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Sledges,
Blacksmiths' Sledges,
Masons' Brick Hammers,
Swedges, all sizes,
Mill Picks, Crow Bars,
Mail Tongues.

Smiths' Hand Hammers,
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Masons' Stone Axes,
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Striking Hammers,
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Horse Shoers' Tools,
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HAMMERS of all kinds made to order, on receipt of Pattern or Drawing. Special attention paid to R. R. Work.



Something New for

OTIS FURNACES & MINES. New Union Steam Safety Elevator,

How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO.,
Whooling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & CO., New York.

Dear Sirs: The experience of a year proves that your Furnace Elevator is superior to all others in use. We have in the six weeks from December 1st to Sunday last, 15th inst., made 9734 tons, 1402 lbs. of Pig Metal, or an average of near 65 tons per day, which required the elevator to lift 72 feet high 4 1/2 tons Ore, Coke and Limestone for each ton of Metal produced, or more than 11,500 tons material in the 6 weeks. The largest yield in one day was 311 1/4 tons Iron, involving the lifting of 345 tons material in 24 hours. This has all been done to our satisfaction, and that, too, in the coldest weather we have had. Other furnaces with water and pneumatic hoists have experienced great difficulty, on account of the water freezing in the tanks; and in the case of the air hoists, we understand that two furnaces, not far from us, had to "blow out" from being unable to hoist stock during the "cold snap." The difficulty, we are told, was caused by the condensed moisture in the blast freezing to the sides of the cylinders, so that the piston could not move up or down. Very truly, yours,
DEWEY, VANCE & CO.

Send for Circular to

OTIS BROTHERS & CO.,

348 Broadway, NEW YORK.

Biddle Manufacturing Co.,

FINE TOOLS

AND

Hardware Specialties.

We call the attention of Carriage Makers, Machinists, Iron Railing Manufacturers, Blacksmiths, and all others interested in Drilling, Punching or Cutting Iron, to our

Improved Drill Press, Shear and Punch,

feeling assured that upon examination their merits must be apparent to every one, from the fact that they possess the essential characteristics of strength, power and cheapness, in a high degree.

Illustrated Catalogues and Price Lists furnished on application.

We are also prepared to furnish light work of any description and in any quantity to order.

All kinds of Die Forgings promptly attended to.

OFFICE & WAREHOUSES, 78 Chambers Street, New York,

JAMES E. HALSEY,

76 Reade Street, N. Y.,

AGENT

Industry Manuf'g Co.,

MANUFACTURERS OF

Railway, Blacksmiths' and Miners' Tools,

Railroad and Coal Picks, Crew Bars, Mauls, Tamping Bars and Picks, Rail Tongs, Sledge, Hand, Stone and Striking Hammers, Smiths' Tongs, Gas Pipe Tongs, Telegraph Pole Bars, Cold Chisels, Wedges, Froes, Cast Steel Drills, and

MINERS' TOOLS of all descriptions.

ALSO,

SALT MANUFACTURERS' TOOLS,

Bittering Pans, Ladles, Kettles, &c.

Prices furnished on application.

BUILDERS' HARDWARE,
Pure Bronzed Metal and Hand-Polished Knobs, Hinges, &c.,
Agents for Gentler's Black Lead Crucibles,
Agency and Depot of the TRENTON LOCK COMPANY.

Chain and Pulley for Heavy Sash,
F. & L. MARY & MARSHALL,
48 Warren Street, NEW YORK,
Manufacturers of every description of



CHAS. BROMBACHER,
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MANUFACTURERS OF
TINSMITHS' TOOLS AND MACHINE
PAPER-BOX MAKERS' DO.,
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Hotels, Mills, Public Buildings, &c., furnished with Hose, Iron Piping, Hydrants and all kinds of Fire Supplies.

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Rubber and Brass Discharge Pipes, Hats, Caps, Belts, Buckets, Trampets, Axes, Hose and Ladder Straps, Spanners, &c.
Patent SCREW and RING COUPLING and SPRAY NOZZLE.

Send for Price List.

ALBERT F. ALLEN, Providence, R. I.

BUSINESS ITEMS.

PENNSYLVANIA.

"The Allegheny Car and Transportation Company" is the title of a corporation which has been organized under a charter which authorizes them to build, equip, rent or contract for cars or other railroad vehicles, and to sell, use or rent the same to any person or corporation, or to transport freight. Thus the company possesses the franchises of a car manufacturing company, a rolling stock company, with privilege to rent its cars to railroad or transportation companies and individuals, and a transportation company or freight line. The capital stock is \$100,000, which may be increased to \$500,000. About \$80,000 has been already subscribed, and three acres of ground have been purchased in Wilkesburg as a site for the car works. The erection of buildings will be commenced when the season opens, and the entire establishment completed at an early day. The men who are at the head of the enterprise are some of our most substantial citizens, and have the skill requisite to make the business remunerative.

The Shenango Iron Works, of New Castle, have the contracts for manufacturing all iron needed in the construction of bridges on the New Castle and Franklin Railroad.

The Lehigh Stove and Manufacturing Company, at Lehigh, has a contract for furnishing the American Buttonhole Sewing Machine Company full sets of castings for 18,000 machines, and another contract for furnishing Messrs. A. & N. Middleton, of Philadelphia, with 500 car boxes. This is evidence of a high degree of prosperity.

The Danville rolling mills have ceased operations.

The bolt and augur works, situated at White Rocks, Fayette County, are shortly to be removed to Dunbar, where the building is now being erected.

The Pennsylvania Iron Works, Danville, are putting in a new engine and pair of butt rolls in order to roll rail ends without reheating. Their furnaces No. 1 and 3 are turning out an excellent quality of foundry iron.

The Crane Iron Company, says the Catsaquas Dispatch, are constructing a new pattern of cinder cars, which will be capable of hauling nearly twice the quantity those now in use do, and it is said they will be far superior to any in the Lehigh Valley.

MISSOURI.

The Vulcan Iron Works, at South St. Louis, resumed operations Feb. 10.

The Moselle Furnace, employs about 350 hands, and forms a village of some 30 buildings beside the buildings of the company. This furnace was established in 1843 by J. H. Brown & Co., of Ohio. The furnace has a capacity of 20 tons per day of pig iron, about one-half of foundry No. 1, one-fourth each of foundry No. 2 and mill iron No. 1. The company have ore land convenient, also one mine near Beaver Switch, and one near St. James.

The Vulcan Iron Works, of St. Louis, have declared a dividend of 16 1/2 per cent. out of the earnings of the past six months. They have received 30 new coal cars from Litchfield, Ill., for their own use, and now bring their coal from Big Muddy by rail, and will during the entire year.

The new rail mill at Springfield continues in successful operation. The mill is supplied with coal, at 6 cents per bushel, from a shaft adjoining. A trestle and tramway extend from the shaft to the mill. The proprietor of the shaft pays the miners 4 cents per bushel for mining.

CALIFORNIA.

At the Occidental Foundry, San Francisco, the monuments to be used in making the boundary line between Nevada and Oregon are being cast. The monuments are quite plain, and bear the letters "Nevada, Oregon, Longitude, Degrees," and were designed by Colonel Von Schmidt.

The California Machine Works, in San Francisco, have just got under way. The firm intend manufacturing all descriptions of hoisting, pumping and mining machinery, quartz, saw and flour mills, and different kinds of iron and brass work. The majority of the tools for the shop were received from New Haven.

The manufacture of wire rope has been carried on in San Francisco for some time, but lately an establishment there has commenced the manufacture of sub-marine telegraph cables.

OHIO.

The firm of Webster, Camp & Lane, Akron, furnish mining, flour and saw-mill and pottery machinery. Their machine shop is two-stories high 40x70 feet; the foundry 50x65 feet; pattern shop two-stories high and 30x40 feet. They employ 40 men, and their yearly business amounts to \$90,000.

A Wheeling company is about to commence the erection of a large nail mill in Salem at a cost of \$100,000, employing 75 men.

The Tropic Furnace Company, Jackson county, has been incorporated by Thomas Jones, John M. Jones, Daniel D. Morgan, and David P. Davis. Capital stock \$100,000.

At Dayton, the B. C. Taylor Manufacturing Company manufacture horse, hay and grain rakes, threshing machines, horse-powers, brick machines, &c. The business was established nine years ago by B. C. Taylor, and assumed its present firm title in 1870. The company occupy four buildings, covering one square. The main building is a two story, brick, 75x200 feet; another building is 60x125 feet; the warehouse is 60x150 feet; the foundry is 50x100 feet. The company employ 125 men; the capital stock of the company is \$125,000, and the annual business amounts to \$225,000.

The Akron Machine Works embrace five buildings, extending over a space 200x240 feet. One building is a three-story brick, 100x112 feet; the smith shop 36x36 feet, and a three-

story pattern shop 36x100 feet. This firm manufactures steam engines, mill machinery, iron and brass castings, potters' and sewer-pipe machinery, shafting and pulleys, and, among various patents of stoves, the King cooking stove. Their working force numbers eighty men; yearly business, about \$200,000.

The Cleveland Nut Company, Cleveland, are making hot pressed nuts with newly invented machinery, which has never been used in the West. The nuts, it is claimed, are superior to any other make, being entirely free from scale and perfectly smooth, making them easy to tap. In outward appearance they are very perfect. The concern are sole manufacturers of machine forged nuts in the West, and they possess facilities for making them in large quantities. They are running ten washer machines of a new design, having a capacity for five tons daily, making them perfectly flat and true. Messrs. Lamson, Sessions & Co., have the whole management of the works.

The blast furnace at Martin's Ferry is doing exceedingly well. For several days recently it made 34 tons per day, which is considered a good yield for a furnace of its size.

At Newburg, the American Sheet and Boiler Plate Company are putting in a sheet mill. They are also putting up the largest iron corrugating machine in the United States. The machine makes a 5 1/2 inch corrugate from center to center, and works a sheet 9 1/2 feet long. They are engaged in making the iron for the roof of the new passenger depot in Chicago.

MAINE.

At Camden, D. Knowlton & Co. are manufacturing passenger cars with the Miller platform. The Portland and Ogdensburg roads have made a contract with them for 25 of their improved box cars.

MASSACHUSETTS.

A new company was formed at Miller's Falls, February 6th, called Miller's Falls Company, with a capital of \$185,000. The new company's purpose is to consolidate the stock of the Backus Vise Company and Miller's Falls Company, and continue the business of both concerns under one management.

By a vote of the stockholders of the American Watch Company, Waltham, the capital stock of the company is to be increased from \$1,250,000 to \$1,500,000.

CONNECTICUT.

A new passenger engine, to weigh about 60,000 pounds, with a six-inch cylinder and twenty-two-inch stroke, is being built by the Hartford, Providence and Fishkill Railroad Company. The driving wheels are to be five feet in diameter. The company intend to put on their cars either the vacuum or Westinghouse air-brake.

At Bridgeport the labor question has broken out, and the proprietor of the malleable iron works, Elisha Hubbel, discharged twenty-five of his men for forming a union and annoying him, and supplying their places with men from Lowell. This so exasperated the discharged men that they attacked the others as they were going to their boarding house, inflicting injuries on one which is expected to prove fatal. Nine of the rioters have been arrested.

KENTUCKY.

Owensboro will have a stove foundry in operation in a week or two.

We learn that the Legislature of Kentucky has recently granted the Norton Iron Works, of Ashland, a special charter with liberal provisions and valuable franchises, and an increase of capital from \$700,000 to \$3,000,000, and that it is the intention of the Company to reorganize under it immediately. Heretofore they have had a charter under the general laws of the State. The new charter grants ample powers to enable the company to largely increase the extent and character of their enterprises in the development of their valuable mineral property, consisting of Star Furnace lands in Boyd Co., and Steam Furnace lands in Greenup county. Under the able and energetic management of the president, Col. E. M. Norton, their furnace and nail works are being pushed rapidly forward toward completion notwithstanding the unfavorable winter for such works.

Three iron producing establishments in Boyd county have netted Kentucky more profit than the entire tobacco crop of the State.

Consumption of Timber in Railroad Ties.

—Estimating the railways of the United States as equal, including sidings, double tracks, &c., to 60,000 miles of single track, the aggregate number of ties would be 150,000,000, at the rate of 2500 to the mile. "This," says a recent circular of the lumbermen of Pennsylvania, "requires the timber from twelve and a half acres of well-timbered lands to furnish, because the average of trees from which railroad ties can be cut will not exceed forty to the acre, nor can there be cut more than five ties from each of these forty trees. The average life of a railroad tie is said to be about five years—consequently, 30,000,000 are requisite for repairs annually, and to furnish this amount will consume 2,500,000 acres of the best timber land. In addition to this vast area, about 500,000 acres are required annually to supply ties for the new roads which are being constructed each year." The circular referred to has been sent to lumber dealers and consumers through the State, calling attention to the condition of the lumber interests. It appears from this that the amount of pine lumber annually cut on the Susquehanna River and its tributaries exceeds 500,000,000 feet. Should this amount be cut for the next five years it would amount to 2,500,000,000 feet. A careful estimate has been made of the area of the timber lands, and the average yield of lumber per acre, and the alarming conclusion is reached that three years' stocking at the present rate of 500,000,000 feet per year would entirely exhaust all the pine lumber now standing. These statements are made after very careful estimates, and with the indorsement of the most experienced lumbermen in the State.

Keystone Saw, Tool, Steel & File W'ks,

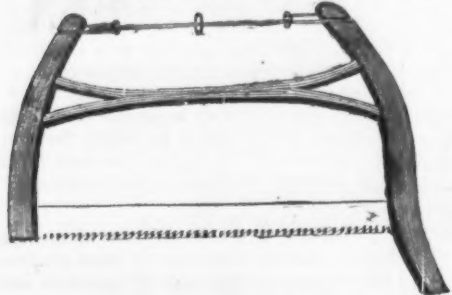
Front & Laurel Sts., PHILADELPHIA, PA.

HENRY DISSTON & SONS,

having rebuilt that portion of their extensive Works destroyed by the conflagration of Nov. 15, 1872, and having introduced new and improved Machinery for the Manufacture of every Article of the Trade, are prepared, with their increased facilities, to fill all orders with punctuality, promptness and dispatch.

Hankins' Elliptic Forked Saw Frame.

Patented June 28th, 1870.



The annexed engraving represents HANKINS' ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Brace being all in one piece, without any centre bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

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VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

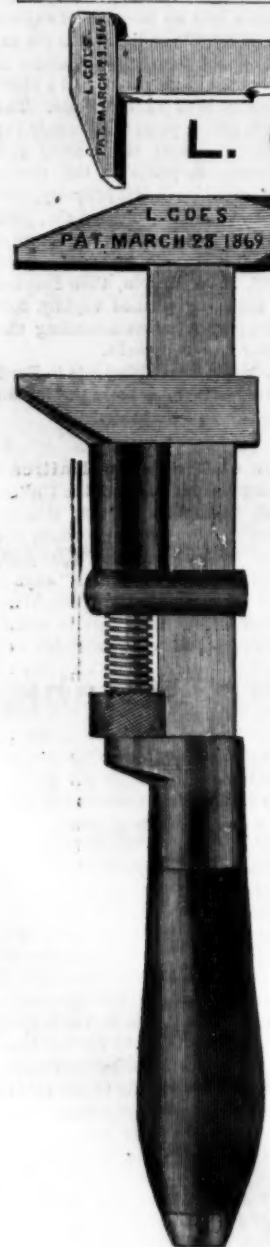
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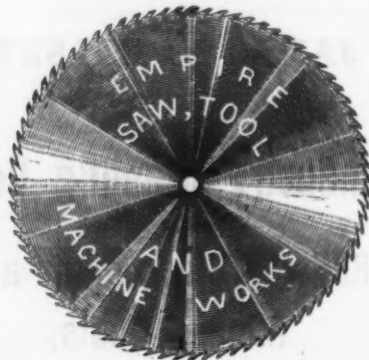
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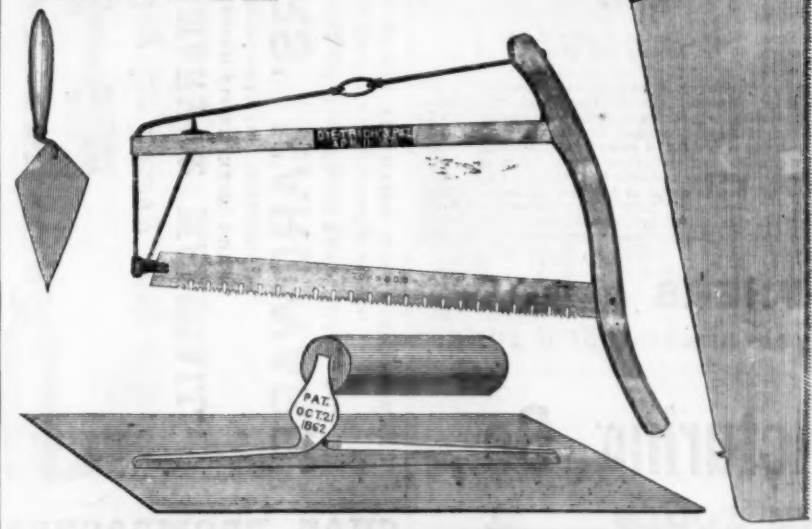
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10	3.47	40	11	3.20	38	12	2.80	35	14	2.43	33	16	2.00	30	18	1.39	30
11	2.75	32	12	2.45	31	13	2.15	30	15	1.97	30	17	1.47	25	19	1.08	25
12	2.10	26	13	1.85	25	14	1.62	25	16	1.51	25	18	1.11	20	20	0.76	20
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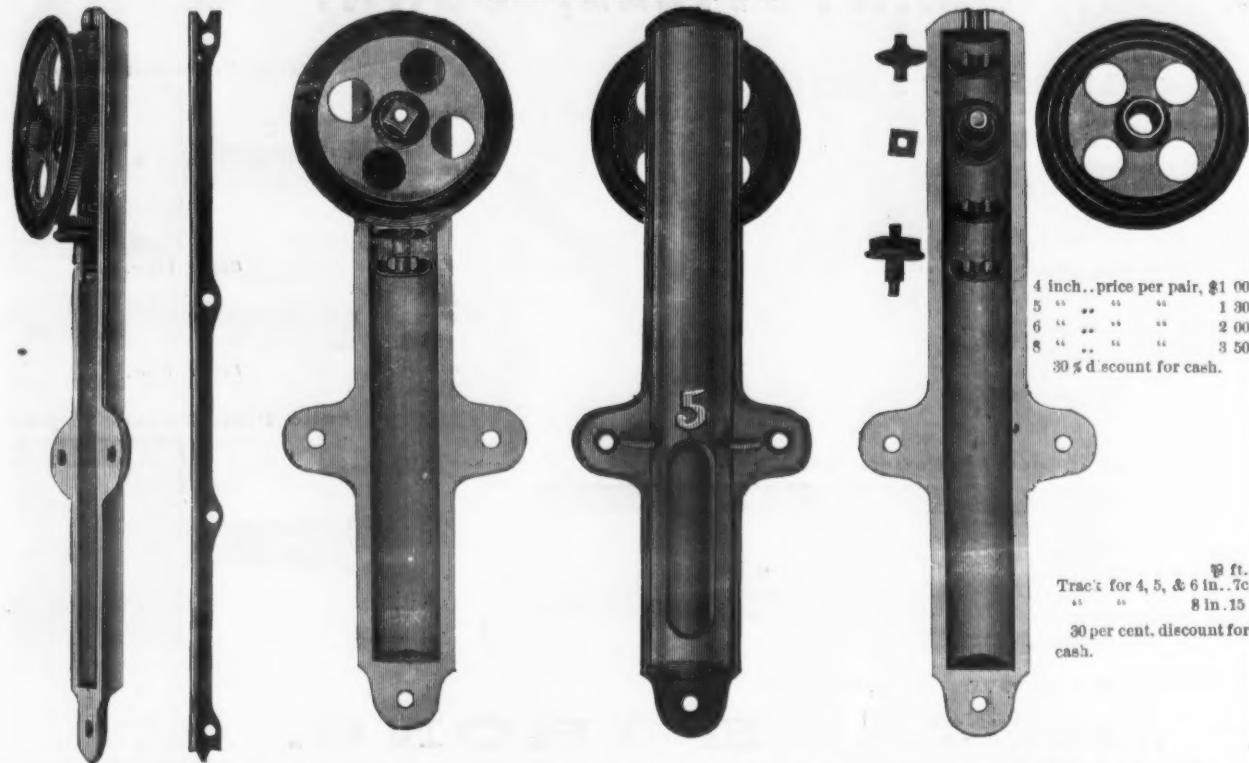
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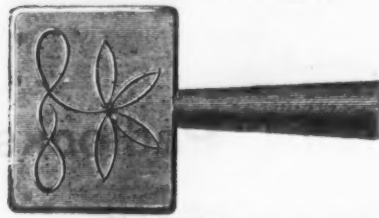
563 Market Street,

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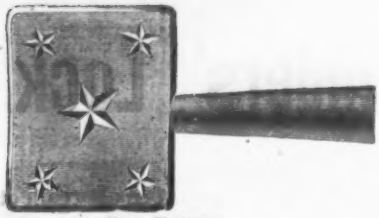
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Patent Embossed Steps,



Leaf Pattern.



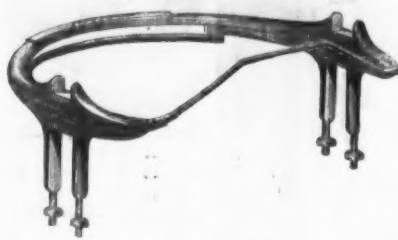
Star Pattern.

King Bolt Yokes.



Established 1850.

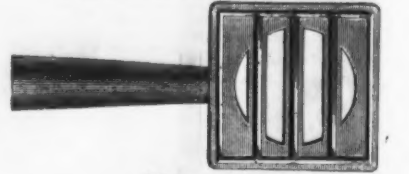
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.

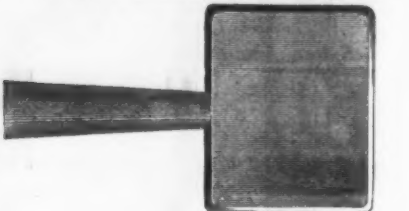


Upper View.

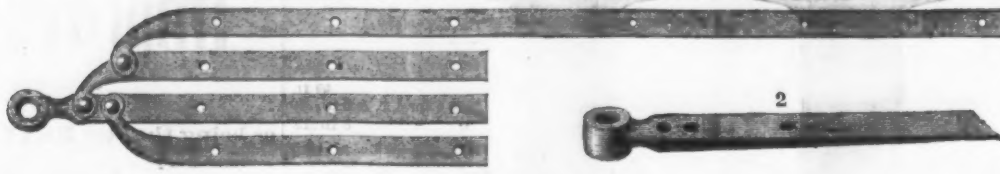


Lower View.

Solid Plain Pattern Steps.



Smith's Improved Philadelphia Pattern Slat Irons.



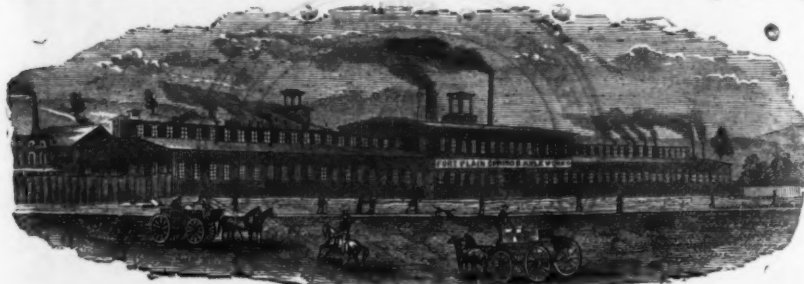
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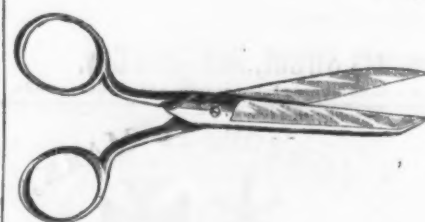
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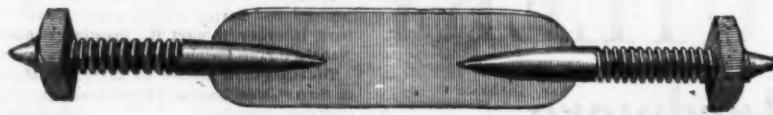
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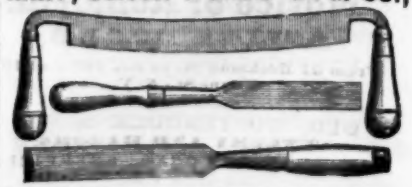
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The Iron Age Directory

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Wentworth H. M. & Co., Gardiner, Me.	12
Band Saw Machines, Makers of.	
Richards, Loudon & Kelley, Phila.	31
Bellevue, Manufacturers of.	
Churchyard Joseph, Buffalo, N. Y.	15
Newcomb Bros. & Sons, 586 Water, N. Y.	24
Belted Leather, Makers of.	
Alexander Bros., 413 N. 3d, Phila.	13
Bacon Bros., Pawtucket, R. I.	13
Stoyle Wm. H., 403 Library, Phila.	12
Belt Pumps, Manufacturers of.	
Kellogg E. C. & Co., Hartford, Conn.	9
Bird Cages, Makers of.	
Lindemann O. & Co., 254 Pearl, N. Y.	6
Maxheimer John, 249 Pearl, N. Y.	22
Bit Braces, Manufacturers of.	
Miller's Falls Mfg. Co., 78 Beekman, N. Y.	21
Boilers Steam.	
Burnet & Leonard, Newark, N. J.	21
Verner, Thos. 30th and Chestnut, Phila.	81
Boiler Compound, Makers of.	
Mayer L., 99 Mercer, N. Y.	20
Bolt Heading Machines, Mfrs. of.	
Chapin Machine Co., New Hartford, Ct.	30
Lewis, Oliver & Phillips, Pittsburgh, Pa.	7
Plumb, Burdick & Barnard, Buffalo, N. Y.	33
Books.	
Henry K. Van Sien, 133 Nassau, N. Y.	14
Brass, Manufacturers of.	
Ansonia Brass & Copper Co., 19 Cliff, N. Y.	2
Benedict & Burnham Mfg. Co., Waterbury, Ct.	2
Brooklyn Brass & Copper Co., 100 John, N. Y.	2
Coe Brass Mfg. Co., Wolcottville, Conn.	2
Plume & Atwood Mfg. Co., 80 Chambers, N. Y.	2
Scovill Mfg. Co., 4 Beekman, N. Y.	2
Wallace & Sons, 89 Chambers, N. Y.	2
Waterbury Brass Co., 52 Beekman, N. Y.	2
Brick Presses, Makers of.	
Carnell Geo., 1819 Germantown Ave., Phila.	30
Carnell F. L. & D. R., 1844 Ger. Ave., Phila.	30
Miller S. P., 309 S. 6th, Phila.	30
Bridge Builders.	
Moseley Iron Bridge and Roof Co., 5 Day, N. Y.	4
Bronze Wares, Manufacturers of.	
Whitney Mfg. Co., 163 & 164 W. 27th St., N. Y.	11
Brushes, Manufacturers of.	
Wood E. C., 299 Pearl, N. Y.	13
Bulls and Hinges, Makers of.	
Etina Nut Co., Southington, Conn.	14
Crooke & Co., 163 Mulberry, N. Y.	20
Roy & Co., West Troy, N. Y.	22
Stanley Works, 58 Beekman, N. Y.	22
Union Mfg. Co., 55 Chambers, N. Y.	5
Cabinet Hardware, Manufacturers of.	
Landers, Fray & Clark, 53 Chambers, N. Y.	11
Carriage Bolts, Makers of.	
Skelly T., 24th below Callowhill, Phila.	12
Townsend, Wilson & Hubbard, Phila.	12
Carriage Hardware, Makers of.	
Smith H. D. & Co., Plantville, Ct.	12
Car Wheels, etc., Manufacturers of.	
Jackson & Woodin Mfg. Co., Berwick, Pa.	4
Taylor Iron Works, High Bridge, N. J.	6
Cash Drawer-Alarm, Manufacturers of.	
Tucker & Dorsey, Indianapolis, Ind.	14
Casters-Furniture, Manufacturers of.	
Toler John, Sons & Co., Newark, N. J.	26
Chains, Makers of.	
Kendrick & Runkle, Trenton, N. J.	31
Cherry Stoppers, Makers of.	
D. H. Goodell, Antrim, N. H.	2
Chisels, Manufacturers of.	
Buck Bros., Millbury, Mass.	22
Hart, Bliven & Mead Mfg. Co., 243 Pearl, N. Y.	12
Clothes Wringers, Manufacturers of.	
Providence Tool Co., 11 Warren, N. Y.	14
Coal, Miners of.	
Pardee A. & Co., 111 Broadway, N. Y.	13
Coal Hods, Manufacturers of.	
Smith, Burns & Co., 45 Cliff, N. Y.	26
Coffin Trimmings, Makers of.	
Wayne Hardware Co., Cincinnati, O.	22
Commission Merchants, English.	
Goddard Samuel A. & Co., Birmingham, Eng.	28
Compasses and Dividers, Manufacturers of.	
Bemis & Call Hdw. & Tool Co., Springfield, Mass.	26
Composition Bolts, Makers of.	
Fuller Frederick, Providence, R. I.	31
Cooper's Tools, etc., Dealers in.	
Littie Chas. E., 59 Fulton, N. Y.	30
Corrugated Steel Pipe Elbows, Makers of.	
Solow Elbow Co., N. Y., and Chicago.	34
Cruetibles, Manufacturers of.	
Newkumet Adam, 1537 N. Front, Phila.	20
Joseph Dixon Crucible Co., Jersey City, N. J.	22
Ross, Strow & Hofkamp, 1438 N. 6th, Phila.	22
Taylor, Strow & Co., Phila.	22
Curry Combs, Manufacturers of.	
Kellogg W. P. & Co., Troy, N. Y.	26
Cutlery, Importers of.	
Bohnstedt-Kind (Solingen), 371 Canal, N. Y.	11
Dickinson Henry, 66 and 68 Reade, N. Y.	11
Fisher Jos. S., 411 Commerce, Phila.	11
King H. & J. W., 80 Chambers, N. Y.	11
Peace Chas. Jr., 82 Chambers, N. Y.	11
Ward Asline, 101 Duane, N. Y.	11
Wilson Hawksworth, Elkhon, N. Y.	11
Smith & Hall, 58 & 60 Reade, N. Y.	11
Taylor Thomas, 43 Chambers, N. Y.	11
Cutlery, Manufacturers of.	
Burkinshaw Aaron, Pepperell, Mass.	11
Landers, Fray & Clark, 226 Broadway, N. Y.	11
Miller Bros. Cutlery Co., W. Me. Idem, Conn.	11
New York Knife Co., Walden, N. Y.	11
U. S. Steel Shear Co., W. Meriden, Ct.	12
Differential Pulley Blocks, Makers of.	
Van Wart & McCoy, 43 Chambers, N. Y.	31
Drug Teeth, Solid Cast Steel.	
Sweets Mfg. Co., Syracuse, N. Y.	12
Dredging, and Makers of Dredging Machines.	
Am. Dredging Co., 214 S. Delaware ave., Phila.	30
Drill Chucks, Manufacturers of.	
Cushman A. P., Hartford, Ct.	11
Hubbard & Currier Mfg. Co., 23 Chambers, N. Y.	21
Drills (Hand), Blacksmiths, Makers of.	
Morell & Tibout, Williamsburg, N. Y.	15
Drilling Machines, Makers of.	
Thorne & DeHaven, Philadelphia.	30
Edge Tools, Makers of.	
G. W. Bradley, 37 Chambers, N. Y.	8
Elevators, Makers of.	
Brooks L. B., 60 Cliff, N. Y.	2
Otis Bros. & Co., 245 Broadway.	2
Emery Wheels, Makers of.	
The Tanite Co., Stroudsburg, Pa.	7
The Union Stone Co., 16 Exchange, Boston.	29

Enamelled and Plain Hollow Ware, Mfrs. of.	
Foxell & Jones, Troy, N. Y.	31
Engineers, Machinists, etc.	
Henshall James, 1036 Beach, Phila.	30
Taws & Hartman, 1235 N. Front, Phila.	30
Engines, Steam, Makers of.	
Fishkill Landing Mch. Co., Fishkill-on-the-Hudson, N. Y.	30
N. Y. Steam Engine Co., 121 Chambers, N. Y.	30
Utica Steam Engine Co., Utica, N. Y.	30
Whitehill, Smith & Co., Newburgh, N. Y.	34
Wright J. W., 112 Spruce, Phila.	31
Engines, Portable, Makers of.	
Hoadley J. C. & Co., Lawrence, Mass.	30
Engravers, Wood.	
Roberts Wm., 36 Beekman, N. Y.	28
Tittle D. H., 5 Beekman, N. Y.	28
White H. R., 22 John, N. Y.	29
Faucets, Self Measuring, Makers of.	
Enterprise Mfg. Co., of Pa., Phila. and N. Y.	26
Files, Importers of.	
Carr J. & Riley, 82 John, N. Y.	28
Dickinson Henry, 66 and 68 Reade, N. Y.	11
Fisher Joseph S., 411 Commerce, Phila.	11
Moss F. W., 80 John, N. Y.	28
Sanderson Bros. & Co., 16 Cliff, N. Y.	28
Spear & Jackson, 98 Chambers, N. Y.	22
Fires, Manufacturers of.	
Barnett G. & H., 41 and 43 Richmond, Phila.	8
McCaffrey & Bro., 1732 and 1734 N. 4th, Phila.	8
Nicholson File Co., Providence, R. I.	8
Rothery John & William, 83 Chambers, N. Y.	11
Wheeler, Clemson & Co., Middletown, N. Y.	10
Fire Arms, Manufacturers of.	
Remington E. & Sons, Ilion, N. Y.	7
Schoverling & Daly, 84 Chambers, N. Y.	7
Parker Bros., West Meriden, Conn.	7
Fire Bricks, Importers of.	
Hammill & Gillespie, 240 and 242 Front, N. Y.	6
Fire Bricks, Makers of.	
Bowman O. & Co., Trenton, N. J.	20
Hall A. & Sons, Perth Amboy, N. J.	20
Kreischer B. & Goerck, N. Y.	20
Newkumet Philip, 234 and Vine, Phila.	20
Palmer, Newton & Co., Albany, N. Y.	20
Watson John R., Perth Amboy, N. J.	20
Fire Department Supplies, Mfrs. of.	
Allen Albert F., Providence, R. I.	9
Felted, Salamander, Manufacturers of.	
U. S. & Foreign Sal. Felted Co., Troy, N. Y.	31
Gage Cocks & Damper Regulators.	
Murrill & Keizer, Baltimore, Md.	31
Galvanized Iron.	
Lefferts Marshall Jr., 94 Beekman, N. Y.	4
Clark & Co., Buffalo, N. Y.	22
Glass, Importers of.	
Downing A. C. & Co., 57 Beekman, N. Y.	13
Governors, Makers of.	
Lynde J. D., Philadelphia, Pa.	31
Grindstones.	
McDermott J. & Co., Cleveland, O.	29
Wood Walter R. & Co., 283 and 285 Front, N. Y.	29
Gunpowder, Makers of.	
Kneeland F. L. (Dupont) 70 Wall, N. Y.	28
Ladlin & Rand Powder Co., 21 Park Row, N. Y.	28
Hammers, etc., Manufacturers of.	
Industry Mfg. Co., 76 Reade, N. Y.	9
Nelson Tool Works, 157 E. 3rd, N. Y.	9
Handles, Makers of.	
Smith J. W. H. & Co., Charlotte, Mich.	11
Hardware Auctioneers.	
R. T. Hazell & Co., 118 Chambers, N. Y.	17
Hardware, Brass and Galvanized.	
Tiebout W. & J., 290 Pearl, N. Y.	2
Hardware, Commission Merchants.	
Fernald & Sise, 31 Beekman, N. Y.	8
Gerzabek O. V., San Francisco, Cal.	11
Green R. M. & Co., 100 Chambers, N. Y.	12
Graham & Haines, 88 Chambers, N. Y.	21
Halsey J. E., 76 Reade, N. Y.	21
Jewett & Roberts, 103 Chambers, N. Y.	22
Walbridge Geo. B., 55 Chambers, N. Y.	22
Hardware Dealers.	
Brower J. & Co., 288 Greenwich, N. Y.	22
Flancy Thos. L. & Co., 42 Chambers, N. Y.	22
Hubbard & Currier Mfg. Co., 82 Chambers, N. Y.	21
Lloyd, Supplee & Walton, 635 Market, Phila.	8
Louderback, Gilbert & Co., 53 Chambers, N. Y.	11
Shapard Sidney & Co., Buffalo, N. Y.	21
Turner, Seymour & Judd, 64 Duane, N. Y.	8
Walsh, Coulter & Flagler, 83 Chambers, N. Y.	11
Hardware Importers.	
Beam & Murray, 54 Cliff, N. Y.	22
Baker Hermann & Co., 101 Duane, N. Y.	22
Field Alfred & Co., 47 John, N. Y.	21
King H. & J. W., 80 Chambers, N. Y.	11
E. F. H., 16 Cliff, N. Y.	11
Louderback, Gilbert & Co., 53 Chambers, N. Y.	11
Van Wart & McCoy, 43 Chambers, N. Y.	21
Turner R. A., 37 Chambers, N. Y.	11
Wiebusch F., 84 Chambers, N. Y.	22
Hardware Manufacturers.	
Widdie Mfg. Co., 78 Chambers, N. Y.	22
Enterprise Mfg. Co., Phila.	26
Hart, Bliven & Mead Mfg. Co., 243 Pearl, N. Y.	12
Hubbard & Currier Mfg. Co., 82 Chambers, N. Y.	21
Kellogg Wm. P. & Co., Troy, N. Y.	26
Lang, Gale & Co., Troy, N. Y.	26
Louderback, Gilbert & Co., 53 Chambers, N. Y.	11
Many F. L. & Marshall, 48 Warren, N. Y.	9
Middletown Tool Co., 83 Chambers, N. Y.	8
Miller's Falls Mfg. Co., 78 Beekman, N. Y.	21
Fruit & Co., Buffalo, N. Y.	22
Providence Tool Co., 11 Warren, N. Y.	14
Russell & Erwin Mfg. Co., 45 Chambers, N. Y.	24
Shattuck W. F. & Co., 113 Chambers, N. Y.	8
Stanley Works, 58 Beekman, N. Y.	22
Taylor Mfg. Co., New Britain, Conn.	22
Union Mfg. Co., 55 Chambers, N. Y.	5
Williams, White & Churchill, 73 Warren, N. Y.	8
Wilson Mfg. Co., 37 Chambers, N. Y.	21
Hardware Specialties.	
Biddle Mfg. Co., 78 Chambers, N. Y.	9
Louderback, Gilbert & Co., 53 Chambers, N. Y.	11
Sample, Birge & Co., St. Louis.	32
Helve Hammers, Makers of.	
Bradley Mfg. Co., Syracuse, N. Y.	25
Hoes, Makers of.	
Peters Bros., Mfg. Co., Marshall, Mich.	14
Holding Engines, Makers of.	
Morris Co. Mch. and Iron Co., 36 Cortlandt, N. Y.	30
Otis Bros. & Co., 345 Broadway, N. Y.	9
Horse Nails, Makers of.	
Anable Horse Nail Co., 25 Chambers, N. Y.	22
Brundage & Co., Middletown, N. Y.	22
Globe Nail Co., Boston, Mass.	22
Pratt & Co., Buffalo, N. Y.	22
Putnam, S. & Co., Neponset, Mass.	22
Horse Shoes, Makers of.	
Burden Iron Works, Troy, N. Y.	4
Hubs and Spokes, Mfrs. of.	
Gleason, J., 3rd & Diamond, Phila.	12
Ice Cream Freezers, Makers of.	
Tory E. S. Jr., 166 Fulton, N. Y.	12
Insurance, Boiler.	
Hartford Steam Boiler and Inspection Co.	11
Iron Brokers.	
Boydton Geo. A., 70 Wall, N. Y.	4
Hazard & Jones, 212 Pearl, N. Y.	4
Pettit Wm. H., 73 Wall, N. Y.	4
Iron, Charcoal, Warm or cold blast.	
Quincy John W., 98 William, N. Y.	4
Iron Commission Merchants.	
Blakiston & Co., 333 Walnut, Phila.	6
Hand Jas. C. & Co., 614 & 616 Main, Phila.	5
Malin Bros., 228 Dock, Phila.	5
Iron, Pig, Importers of.	
Williamson James & Co., 69 Wall, N. Y.	4
Iron, Dealers.	
Abel Brothers, 190 South, N. Y.	4
Bigelow & Johnson, 48 Pine, N. Y.	4
Bonnell, Botsford & Co., Youngstown, O.	4
Borden & Lovell, 70 & 71 West, N. Y.	4
Buchanan Geo., 19 Birch Lane, London, E. C.	4
Cleveland Brown & Co., Cleveland, O.	4
Coddington T. B. & Co., 35 Cliff, N. Y.	4
Conklin & Huerstel, 99 Market Slip, N. Y.	4
Davidge & Wheeler, 734 Pine, N. Y.	4
Fuller, Lord & Co., 139 Greenwich, N. Y.	4
Fuller, Dana & Fitz, 110 North, Boston.	4
Gardner Wm., 575 Grand, N. Y.	4
Hall, Kimbark & Co., Chicago.	4
Harrison & Gilboe, 555 to 552 Water, N. Y.	4
Jackson & Shaw, 206 and 208 Franklin, N. Y.	4
Judson B. F., 457 and 459 Water, N. Y.	4
Matthews Chas. W., 123 Walnut, Phila.	4
Packard, Goff & Co., Youngstown, O.	4
Piereson & Co., 94 Broadway, N. Y.	4
Richards D. W. & Co., 92 Mangum St., N. Y.	4
Swan John E. & Bros., Glasgow, Scotland.	4
Smith Gam'l G. & Co., 343 Pearl, N. Y.	4
Warner A. B. & Sons, 25 & 27 West, N. Y.	4
Williams James & Co., 69 Wall, N. Y.	4
Whitney Alfred R., 38 Hudson, N. Y.	4

Iron, Manufacturers of.	
Atwater & Wheeler & Co., New Haven, Conn.	6
Britannia Iron Works, Middleboro', Eng.	6
Burden Iron Works, Troy, N. Y.	6
Carrington, McCurdy & Co., Cleveland, O.	6
Cleveland Rolling Mill Co., Cleveland, O.	6
Coffin Wm. E. & Co., 8 Oliver, Boston.	4
Elizabeth Iron Co., Elizabethport, N. J.	4
Kills W. R. & Co., 17 Battery March, Boston.	4
Everson, Grant & Merum, Pittsburgh, Pa.	4
Fulton S. & Co., 413 Walnut, Phila.	4
Jones & Laughlin, Pittsburgh, Pa.	4
Leonard John, 450 & 451 West St., N. Y.	4
Lynchburg Iron Works, Lynchburg, Va.	4
Milwaukee Iron Co., Milwaukee Wis.	4
Niles Iron Co., Niles, Mich.	4
New Haven Rolling Mill Co., New Haven, Ct.	6
Old Dominion Iron and Nail Works Co., Rich- mond, Va.	6
Oxford Iron Co., 83 Washington, N. Y.	4
Phoenix Iron Co., 40 Walnut, Phila.	4
Rowland, Wm. & Harvey, Phila.	39
Iron, Hoop, Manufacturers of.	
Wm. Clark & Co., Pittsburgh, Pa.	4
Japans and Brunswick Black.	
London Mfg. Co., 246 Grand, N. Y.	29
Iron, Sheet, Manufacturers of.	
Reese & Co., Pittsburgh, Pa.	4
Iron, Swedish, Importers of.	
Jessop Wm. & Sons, 91 and 93 John, N. Y.	28
Mander Nils, 322 E. 11th, N. Y. and Phila.	4
Ross & Co., Boston, N. Y. and Phila.	4
Lece Leather, Manufacturers of.	
Coupe Wm. & Co., St. Attleboro, Mass.	4
Lanterns, Manufacturers of.	
Howard & Morse, 45 Fulton, N. Y.	2
Lawn Mowers, Manufacturers of.	
Barlow & Walker, Sing Sing, N. Y.	14
Graddon & Cole, 290 Lake, Newburgh, N. Y.	31
Hill's Archimedean Lawn Mower Co., Hartford, Ct.	25
Lead and Tin Lined Lead Pipe, etc, Mfrs.	
Colwell, Shaw & W. Mfg. Co., 213 Centre, N. Y.	2
Locks, Manufacturers of.	
Mallory, Wheeler & Co., New Haven, Conn.	11
Gorwich Lock Co., Norwich, Conn.	12
Ross & Co., 200 E. 11th, N. Y.	31
Sargent, Greenleaf & Cole, 300 Broadway, N. Y.	32
Trenton Lock Co., 48 Warren, N. Y.	9
Yale Lock Mfg. Co., 1 Barclay, N. Y.	22
Machinery, Makers of.	
Fishkill Landing Mch. Co., 63 Bleeker, N. Y.	20
Griffin & Co., 25 Delancey, N. Y.	31
Mason V. & Co., Providence, R. I.	31
Morris Co. Machine and Iron Co., Dover, N. J.	20
Chapin Machine Co., New Hartford, Conn.	30
Fruit & Whitney Co., Hartford, Conn.	30
Sutton Wm. & Co., 200 E. 11th, N. Y.	31
Watson Andrew, 537 Dickinson, Phila.	31
Whitehill, Smith & Co., Newburgh, N. Y.	31
Machine Screws, Makers of.	
Lyons & Fellows Mfg. Co., Williamsburg, N. Y.	30
Machinists' Tools, Makers of.	
Blaisdell P. & Co., Worcester, Mass.	31
Harrington Edw., 150 St., & Pa. Ave., Phila.	31
Malleable Iron, Manufacturers, Makers of.	
Barnett Oscar, Newark, N. J.	8
Tower Daniel L., Elizabethport, N. J.	6
Meat Cutters, Makers of.	
Whitemore D. H., Worcester, Mass.	24
Metal Dealers and Brokers.	
Beknap Aug., 60 Beckman, N. Y.	2
Coddington T. E. & Co., 25 & 27 Cliff, N. Y.	2
Crane U. O., 104 John, N. Y.	2
Harnickell Mass., 85 Beaver, N. Y.	2
Phelps, Dodge & Co., Cliff, N. Y.	2
Pope Thos. J. & Bro., 252 Pearl, N. Y.	2
Thomson A. A. & Co., 213 and 215 Water, N. Y.	2
Van Wart & McCov, 49 Chambers, N. Y.	2
Metallurgists.	
Brown J. Budgett, 339 Walnut, Phila.	14
Drutton & Corlies, 1123 Grand, Phila.	14
Harrington Edw., 150 St., & Pa. Ave., Phila.	14
Henderson James, 30 Broadway, N. Y.	14
Maynard & Van Rensselaer, 34 Cliff, N. Y.	14
School of Mines, E. 49, N. Y.	14
Mining and Railroad Tools, &c., Makers of.	
Washoe Tool Mfg. Co., 61 Park Place, N. Y.	9
Molder's Tools.	
Carter H. & Sons, 290 Pearl, N. Y.	32
Moulds and Reaper Knives, Makers of.	
Simond' Mfg. Co., Pittsburgh, Pa.	12
Monuments, Granite and Brnze.	
National Fine Art Foundry, 213 E. 25th	7
Mouse Traps, Makers of.	
Diets R. E., 54 & 56 Fulton, N. Y.	32
Nickel Platers.	
Smith L. L. & J. T., 123 & 135 W. 25th St., N. Y.	8
Smith L. A., 42 Mechanic St., Newark, N. J.	8
Norway Shapes, Rollers of.	
Rowland Wm. & Harvey, 948 Beach, Phila.	12
Note Broker.	
Gallaudet P. W., 3 and 5 Wall, N. Y.	2
Nuts, Bolts, etc., Makers of.	
Elna Nut Co., Southington, Conn.	14
Am. Bolled Nut Co., Richmond, Va.	14
Arms, Bell & Co., Youngstown, O.	14
Carpenter David, 402 Water, N. Y.	14
Clark Bros & Co., Milldale, Conn.	12
Fuller, Lord & Co., Bonton, N. J.	14
Lehigh, H. & Co., 250 Broadway, N. Y.	14
Lewis, Oliver & Phillips, Pittsburgh, Pa.	14
Plumb, Burdick & Barnard, Buffalo, N. Y.	32
Rhode Island Nut Co., 11 Warren, N. Y.	14
Sternbergh J. H., Reading, Pa.	14
Others, Makers of.	
Ward J. H., Newark, N. J.	32
Ors, Cutting Machinery, Makers of.	
Blake Crusher Co., Pittsburgh, Pa.	30
Paints and Oils, Dealers of.	
Devos F. W. & Co., 117 Fulton, N. Y.	2
N. Y. Enamel Paint Co., 43 Chambers, N. Y.	25
Paper Dealers.	
Hard Melvin & Son, 41 Beekman, N. Y.	21
Patent Solicitors.	
Howson & Son, Phila., and Washington, D. C.	11
Whitney J. A., 125 Broadway, N. Y.	11
Pictures, Artists, etc., Makers of.	
Richards T. C. & Co., 47 Murray, N. Y.	14
Pipes, Fittings, etc., Makers of.	
Eaton & Cole, 56 John, N. Y.	26
Knox B. & Harlin Mfg. Co., 56 John, N. Y.	26
Nelson H. & Co., 250 Broadway, N. Y.	26
Pancost & Manly, 62 Park, Phila.	26
Chas. Gregg Mfg. Co., 23 & 64 Gold, N. Y.	26
Pipe, Water and Gas, Makers of.	
Birk & A. Co., 89 Phila., N. Y.	26
Griff William & Co., Pittsburgh, Pa.	26
Starr Jesse W. & Sons, Camden, N. J.	26
Warren Foundry & Mch. Co., Philadelphia, N. J.	26
Wood B. D. & Co., 178 Broadway, N. Y.	26
Planes, Manufacturers of.	
Sandusky Tool Co., Sandusky, O.	26
Smith & Hule & Co., 53 Chambers, N. Y.	7
Plumbago Lubricants.	
N. Y. Black Lead Works, 173 Forsyth, N. Y.	26
Plumbers' Materials, Manufacturers of.	
Carr Wm. S. & Co., 106 Centre, N. Y.	26
Printers, Householders of.	
The Stiles & Parker Press Co., Middletown, Ct.	31
Pressure Blowers, Makers of.	
Sturtevant B. F., 22 Sudbury, Boston.	31
Printing Presses, Makers of.	
Woods Benj. O., 251 Federal, Boston.	29
Printers and Engravers, Dealers of.	
Vanderburgh, Wells & Co., 110 Fulton, N. Y.	31
Publishers.	
Burr J. B. & Hyde, Hartford, Conn.	20
Public, Makers of.	
Douglas W. & R., Middletown, Conn.	20
Rumsey & Co., Seneca Falls, N. Y.	11
Union Mfg. Co., 55 Chambers, N. Y.	5
Valley Mch. Co., Easthampton, Mass.	5
Railroad Machinery, Makers of.	
Congreve Chas. & Son, 104 and 106 John, N. Y.	28
Hopkins S. W. & Co., 97 Broadway, N. Y.	4
Smith Gilead A. & Co., 62 Broadway, N. Y.	4
Rails, Iron or Steel, Makers of.	
Atkins Bros., 202 E. 11th, N. Y.	6
Cambria Iron Co., Johnston, Pa.	6
Cleveland Rolling Mill Co., Cleveland, O.	6
Griswold John A. & Co., Troy, N. Y.	29
Milwaukee Iron Co., Milwaukee, Wis.	6
Smith & Iron Co., Pittsburgh, Pa.	6
Joliet Iron & Steel Co., Joliet, Illa.	6
Razor Scraps, Makers of.	
B. F. Badger, 61 Elm, Charlestown, Mass.	25
Rider Drills, Makers of.	
Burien & Co., 200 E. Pittsburgh, Mass.	31
Rolling Mill Machinery, &c., Manufacturers of.	
Moore James, Cor. 16th & Buttonwood, Phila.	30
Rolls, Chilled and Sand, Makers of.	
Garrison A. & Co., Pittsburgh, Pa.	30
Rubber Manufacturers, Makers of.	
Chapin, E. M., Pine Meadow, Ct.	30

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PROVIDENCE TOOL CO.,
Providence, R. I.,
Manufacturers of

SQUARE AND HEXAGON COLD AND HOT PRESSED NUTS, PICKS, BOLT ENDS, TURN BUCKLES, CHAIN LINKS, ICE CHAIN, FAST AND LOOSE JOINT HINGES.

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Manufacturing my own stock of Iron from the Pig Metal, and making all sizes of both Square and Hexagon Nuts for 1/4 inch Rods and upward to 3 inch Rods, inclusive. I am able to control quality, and offer a superior article in either large or small quantities, at the lowest possible price.

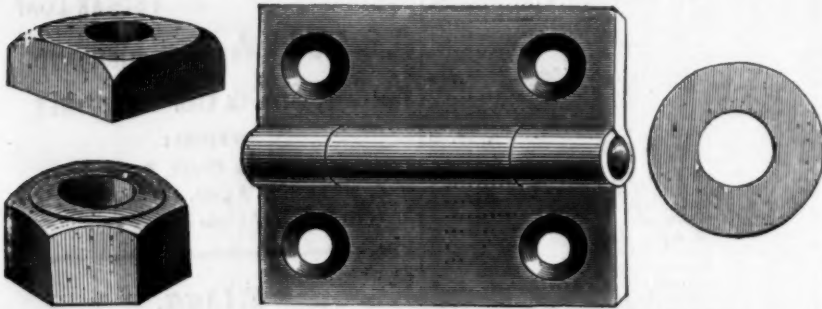
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Manufacturers ofPatent Rolled Hexagon Nuts, Rods
and Tubing.The Patent Rolled Nut is superior
to the best Forged Nut.In the Patent Rolled Nut the iron is not cut away or punched
aside to form the hole, but is rolled over a rod by heavy iron rollers.This process refines the metal. Its fibers are not torn and shocked.
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commend it to machinists.

Warerooms, No. 11 Warren Street, New York.

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Washers, Bolts, Wrought Narrow Butts, Table and Trunk Hinges,

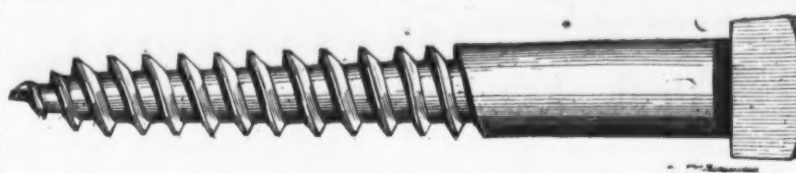
Fellow Plates, Axle Clips, Wrought Clip Yokes, Rivets and Burs,

We desire to call your attention to our **MACHINE FORGED NUTS**. They are made from
extra quality of Iron, combining lightness and strength, and are especially well adapted for Agricultural Ma-
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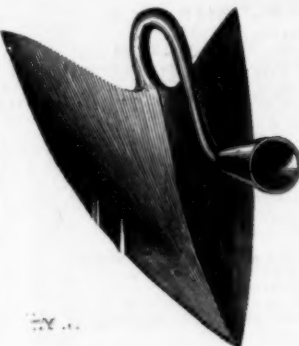
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\$6 per ton more than common coke Pig Iron, and
when mixed with one-half wrought iron makes good
Cast Steel. The Wrought Iron from common coke
Pig Iron makes Cast Steel equal to that made from
the best Swedish Bar Iron.The "Common" Bar Iron from common coke
Pig Iron is stronger, softer and tougher than Low-
moor Iron.The "Common" Boiler Plates from ordinary
coke Pig Iron are stronger, 50 per cent. softer and
100 per cent. tougher than Lowmoor Iron.

For Licenses to make this iron apply to

JAMES HENDERSON,

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**The Iron-Masters'
Laboratory.**Exclusively for the Analysis of Ores of Iron,
Pig and Manufactured Iron, Steels, Limestones
Clays, Slags & Coal for Practical Met-
allurgical Purposes.

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J. BLODGET BRITTON.This Laboratory was established in 1866 at the instance
of a number of Practical Iron-masters, expressly to af-
ford prompt and reliable information upon the chemi-
cal composition of the substances above mentioned, for
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make it at once a convenient, practically useful and
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Silicious Matter, Sulphur and Phosphorus in
an Ore.....\$12.50
For each additional substance..... 1.00
For simply determining the per cent. of Pure
Iron in an Ore..... 4.00
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phur, and Phosphorus in a Pig Iron..... 15.00
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Lime, Insoluble Silicious Matter, Oxide of Iron
and Alumina in an ordinary Limestone..... 10.00
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per cent. of Pure Iron, Insoluble Matter, Sul-
phur and Phosphorus in Ores; Pure Iron Sul-
phur and Phosphorus in Pig Irons; Carbonate
of Lime, Insoluble Matter, Oxide of Iron and
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are admitted without examination, and may pursue any
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be held on June 23rd and September 26th, 1871. For fur-
ther information, and catalogue, apply to**DR. C. F. CHANDLER,**

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of large buyers to our Patent Picture
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Compact, Economical, Powerful, Durable, not easily Clogged
by Ice, Leaves, Shavings, Gravel or Sand.

The best adapted to all contingencies, variable Streams, &c.

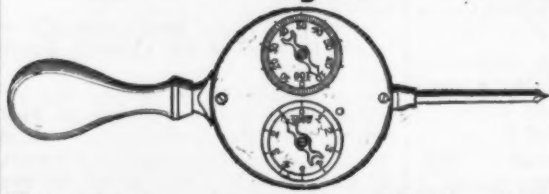
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L. B. Taylor's Patent Speed Indicator.



To ascertain the number of revolutions made by a shaft in any given time: Take the Indicator by the handle in the right hand, holding your watch in the left, press the point of the spindle gently against the end and center of the shaft. To every hundred revolutions of the shaft the Hundred Pointer will make one revolution, while the Thousand Pointer will indicate one number, the dial being marked into ten parts. It may be applied to a shaft revolving either to the right or left.

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GOOCH'S I-X L ICE CREAM FREEZER

FOR CONFECTIONERS' AND FAMILY USE.



Superior to all.
Makes the best Cream.
Takes the least Ice.
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SELLS and PAYS
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SOLID BRONZE HARDWARE,

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Regular Builders' & Miscellaneous Hardware.

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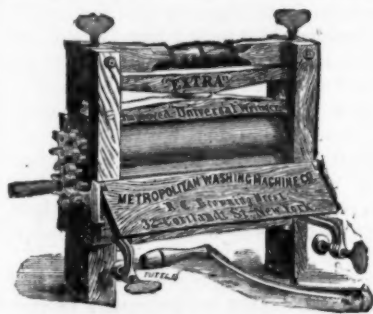
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October 18, 1871.



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Metropolitan Washing Machine Co.,
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WINTER ARRANGEMENT OF TRAINS taking effect
Nov. 4th, 1872. From Chambers St. Depot. (For 2nd
St. see note below).

9:00 A. M. Cincinnati and Chicago Day Express.

Drawing Room Coaches to Buffalo and Niagara
Falls, and Sleeping Coaches to destination.

11:00 A. M. Express Mail for Buffalo and Niagara
Falls. Drawing Room Coach to Susquehanna
and Sleeping Coaches to destination.

5:30 P. M. Night Express. Sleeping Coaches to
Buffalo and Niagara Falls.

7:00 P. M. (Daily) Cincinnati and Chicago Night
Express. Sleeping Coaches through to Cincinnati,
Buffalo, Niagara Falls, and thence to
Chicago.

Additional Trains leave for
Newark, 6:30, 8:45 and 11:30 A. M., and 3:15, 5:15
and 7:30 P. M.

For Port Jervis, 8:00, 9:00, 11:00 and 11:15 A. M.,
4:30, 5:30, 7:30 and 7:00 P. M.

For Goshen and Middletown, 7:30, 8:00, 10:30, 11:00
and 11:15 A. M., 3:30, 4:30, 5:30, 7:30 and 7:00 P. M.

For Warwick, 8:00, 11:00 and 11:15 A. M., 4:30 P. M.

For Newburgh, 8:00, 10:30, 9:00 and 11:00 A. M., 3:30,
4:30 and 5:30 P. M.

For Suffern, 7:30, 8:00, 10:30, 11:00 and 11:15 A. M.,
3:30, 5:30, 7:30 and 7:00 P. M.

For Ridgewood, Hohenstein, Allendale, and Ramsey's,
7:30, 8:00, 10:30, 11:00, 11:15 A. M., 3:30, 5:30, 6:00,
7:30, 7:00 and 11:30 P. M.

For Paterson, 6:45, 7:30, 8:00, 10:30, 11:00, 11:00,
11:15 A. M., 12:00 M., 1:45, 3:30, 4:00, 5:00, 5:15, 5:30,
6:00, 7:30, 7:00, 8:00, 10:00 and 11:30 P. M.

For Rutherford Park and Passaic, 6:45, 7:30, 8:30,
10:00, 11:00 A. M., 12:00 M., 1:45, 3:30, 4:00, 5:15, 6:00,
6:30, 8:00, 10:00 and 11:30 P. M.

For Hackensack and Way, 5:00, 8:15 and 10:45
A. M., 1:00, 4:00, 5:00, 6:00 and 6:30 P. M., and Saturdays
only, 12:00 midnight.

For Hillsdale and Way, 5:00, 8:15 and 10:45 A. M.,
1:00, 4:00, 5:00 and 6:00 P. M., and Saturdays only,
12:00 midnight.

For Cresskill, 5:00, 7:45, 9:00 A. M., 1:30, 3:15,
4:15, 5:30, 6:30 and 7:45 P. M. Saturdays only, 12:00
midnight.

For Upper Piermont, 5:00, 7:45, 9:00 A. M., 1:30,
4:15, 5:30, 6:30 and 7:45 P. M. Saturdays only,
12:00 midnight.

For Piermont and Nyack, 7:45 and 9:00 A. M., 1:30,
4:15, 5:30, 6:30 and 7:45 P. M. Saturdays only,
12:00 midnight.

N. B.—Trains leaving Chambers street on even
hours or half hours leave 2nd street fifteen minutes
earlier than above time. The 5:00 A. M., 10:00 and
11:30 P. M. Trains start from Chambers Street only.

N. B.—Trains on the N. R. R. and Newark Branch
leaving Chambers street on quarter hours, leave 2nd
street thirty minutes earlier than above time.

Tickets for passage and for Apartments in Drawing
Room and Sleeping Coaches can be obtained, and orders
for the checking and transfer of baggage may
be left at the Company's offices: 941, 949 and 957
Broadway; cor. 125 street and 3d avenue; 4 Court
street, Brooklyn; at the Company's Depots, and
of Agents at the principal hotels.

* Daily. † Sundays only. ‡ Goshen Sundays only
\$ Nyack only.

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E. BROWN'S STANDARD PORTABLE,
E. Brown's Improved
Gauntlet



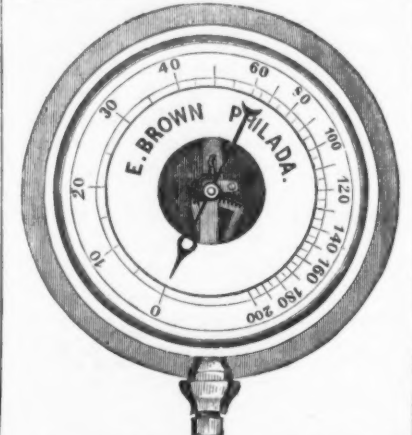
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For Baker's Ovens, Boiler Flues,
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E. Brown's Portable Blast Gauge
for the plug hole, Steam Gauges,
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Recording Steam Gauges, Engine
Counters, Indicators for ascertaining
the Horse Power.

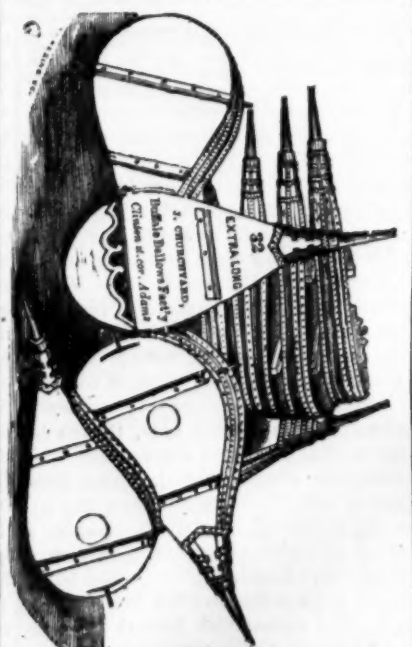
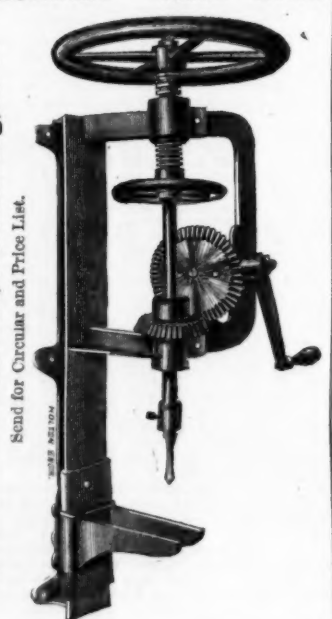


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able Pyrometers are now in use at
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Manufactured by **MORRELL & TIEBOUT,**
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Buffalo Bellows Factory.

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tagious to buy from me, as I sell low, and my loca-
tion enables me to ship at very low rates. No charge
for cartage or other incidental expenses, my quotation
being the whole cost to the purchaser, except the
freight from Buffalo to his location. Please send your
orders

JOSEPH CHURCHYARD,
Clinton cor. Adams Street, Buffalo, N. Y.

The Antwerp Metal Market.
(Translated for The Iron Age from the "Revue
Commerciale et Maritime.")

ANTWERP, Feb. 14, 1873.—Metals.—The market
is quiet and without anything doing for the
want of stock. We have imported during the
week 2063 tons of Pig Iron and 2808 ingots
Copper from England.

The Hamburg Metal Market.
(Translated for The Iron Age from the "Borsen-
halle.")

HAMBURG, Feb. 14, 1873.—Metals.—Lead is
firmly sustained at the recent improvement, but
the dealings are light. German is quotable 23
to 24; English, 24, and Spanish (of Rein & Co.)
24 1/2 marks. Copper has been little inquired
for, but is nevertheless unaltered. Northern
sorts, 97 to 105 marks. Tin is quiet; Banca,
1.65; English, 1.55; rod, 1.60 marks per pound.
Spelter has been in improved demand, and
"spot" has been paid higher. Sales of the
week 8500 cwt. on the spot and to arrive, at
24.19 to 25 marks.

Latest Dutch and India Tin Telegrams.
(Private Dispatches Communicated to The Iron
Age.)

AMSTERDAM, March 1, 1873.—Tin has a down-
ward tendency.

SINGAPORE, Feb. 11, 1873.—Tin—\$36 per picul.
Exchange, 4/5%.

PENANG, Feb. 11, 1873.—Tin—\$34.60 per picul.
Exchange, 4/5%.

Aitken, Spence & Co.'s Ceylon Plumbago
Report.

(Condensed for The Iron Age.)

COLOMBO, Jan. 23, 1873.—Plumbago.—As sur-
mised in our last, the supply of this article is on
the increase, but not sufficiently so to have any
effect on prices, which remain unaltered and
steady. Some few contracts, amounting to
about 300 to 400 tons, have been made for
American account at present rates, deliverable
within the next three months. Prime qualities
continue scarce, while inferior ones are in sup-
ply, and, owing to there being little demand,
the stocks increase. Since we last wrote, two
other small vessels have been taken up to load
for New York direct, and are at present well on
with their loading. We calculate they will take
about 300 tons of this article. Our Galle friends
advise us of a contract having been entered into
there for about 350 tons, deliverable in
three months, of fair quality, and intend-
ed for the American market. The weather
there has been favorable for mining operations
in their districts. We quote Lump, cleaned,
with packages, per ton, first cost 530/-; free on
board with freight and exchange without com-
mission, 616/10 per 20 cwt., freight 80/-
Chip, 328/4, free on board. Dust, 228/10.
Freights.—We have to advise the fixture early
in the fortnight of the John Kendall, 243 tons,
and the Queen of the Fall, 133 tons, to load for
New York, and the Rapido, 229 tons, for Phila-
delphia direct. These are all well on in their
loading, and will, probably, be January sailing.
The latter takes a quantity of Plumbago, with
Coffee and measurement. There is nothing
loading at Galle, but the Francis, referred to in
our last, has arrived, and on discharge will load
at both ports for New York. No cargo, so far
as we can learn, has been booked for her at
Galle. Freights are steady at 80/- for Plumbago.
Exchange, 1/2 to 1 per cent. American for credits,
and par for documents, at 6 months' sight.

New Fire-alarm Box.—It is proposed to
introduce in Cincinnati a new fire-alarm box,
which is thus described by the Commercial: The
apparatus is run by a clock-work, automatically
set in operation by the descent of an iron weight,
which is forced to the top of the box by pulling
down the hook. The machinery once set to
work, the hook can be worked up and down
until the weight completely descends, without
interfering with the clock-work.

The main shaft bears an insulated circuit wheel
of hard rubber, on the cylindrical surface of
which there are inserted a number of metallic
tongues corresponding to the number of the box.
This circuit wheel rotates, and two fixed spring
arms or circuit fingers of German silver press
against and slide on it. These are split so as to
constitute double frictional contact, which for
wear and tear is essential. The rotation of the
wheel successively bringing the metallic tongues
and rubber interstices against the ends of the
circuit fingers, breaks and closes the circuit
made by the two sets of fingers and the main
circuit wires, so that the signal bell at the cen-
tral office, by a due number of strokes, an-
nounces the number of the alarm box. The spec-
imen box presented is fitted so that the work
stops when the circuit wheel has made four revo-
lutions, corresponding with a like number of
registrations.

When the lifter is raised a connection is also
established with an electro-magnet, which neu-
tralizes the action of any other boxes for the
same district for the present alarm—a late im-
provement of great importance under some cir-
cumstances, because more than one box can be
pulled in a district, according to requirements,
without creating confusion. The whole mecha-
nism is most carefully inclosed in a cylindrical
extra box of iron, the cover of which is tightly
fitted and screwed up. This inner case is fixed
within another iron box containing the light-
ning arrester, key and recording bell, all under
lock and key, and accessible only to the office in
charge. This outer box is fixed within the com-
mon alarm box, and when the latter is unlocked
by any of the persons intrusted with signaling
alarms, nothing is exposed but the brass hook, a
pull at which ends the business.

REMOVAL.

We have removed from No. 68 Beekman
Street, to the new and commodious store, No.
101 & 103 Duane Street, near Broad-
way, where will be found our usual assortment

**GUNS, PISTOLS, CUTLERY
FISHING TACKLE.**

And Sporting Articles of every description.

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101 & 103 Duane St., New York.

The Iron Age.

New York, Thursday, March 6, 1873.

DAVID WILLIAMS Publisher and Proprietor.
JAMES C. BAYLES Editor.
JOHN S. KING Business Manager.

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One square (15 lines, one inch), one insertion, \$2.50;
one month, \$10.00; three months, \$25.00; six months, \$45.00; one year, \$80.00; payable in advance.
All communications should be addressed to

DAVID WILLIAMS, Publisher,
80 Beekman St., New York.

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Another General Strike Threatened.

It is currently reported, and generally believed, that the general resumption of business in the spring will witness another general strike, like that ordered by the trade unions last fall on the pretext of a reduction in the hours of labor. What will be demanded this time is not fully known; indeed, it is doubtful if the unions have yet determined what they want. It is understood, however, that different trades will make various demands; some for shorter hours without reduction in wages, some for increased wages without change of hours, and some for other concessions peculiar to the trades making the demands. It is also understood that upward of seventy distinct trades have declared their intention to declare strikes when the movement is started, including the iron founders and moulders, machinists, pattern makers, blacksmiths, engineers, gas and steam fitters and plumbers, tin and sheet iron workers, and other trades connected more or less intimately with our metal working industries. If the reported intention of the unions is fully carried out, there will be a general suspension of manufacturing in and about New York, until labor or capital shall capitulate and abandon the contest.

This information we give for what it is worth. Many of our principal manufacturers have been apprehensive that the differences temporarily adjusted last fall by a return of the strikers to work, would be renewed this spring, and the unions make but little attempt to conceal the fact that a general strike is proposed, in which all organized trades are to take part. It makes but little difference whether labor has any just cause of complaint or not. When a strike is agreed upon, the leaders of such a movement have but little difficulty in fixing upon a pretext, which the specious demagogues who harangue the unions can easily magnify into a grievous wrong or a most desirable advantage, as the case may be. The working classes are easily led, easily deceived with false hopes and expectations, and easily made to believe that capital can be coerced into granting any concessions which labor may choose to demand. The unions promise them support, and only too large a proportion of our workmen will hail any pretext for idleness as a blessing, provided the unions will guaranty to return them a portion of the money they have already paid into their treasuries. There is nothing improbable, therefore, in the intelligence that the men who control the unions are about to precipitate another general conflict between labor and capital for their own ends, or that the workmen who compose the unions, and are willing slaves to their orders

and regulations, are prepared to strike when the signal is given. The question of interest at the present time is, therefore, how is capital prepared to meet the threatened emergency and to defend itself and its rights? Employers wonder that the workmen have not learned the folly of strikes from their costly experiences in the past; have they learned from experience that union and co-operation are the only weapons with which it is possible to combat successfully organized labor acting under orders emanating from some source which the workmen regard as authoritative? We had hoped that the lessons of the great eight hours strike of last fall would not be forgotten, and that employers in all trades would learn from their experiences during that trying season the necessity for the most intimate co-operation and the utmost possible harmony of action when resistance to the demands of the trade unions became a necessity. Possibly our hope was not unfounded, and it is gratifying to note that in several trades employers are already organizing associations, and that the strike, should it come, will not find them wholly unprepared to resist it. That any such organization is necessary is certainly to be regretted, for the labor market would be in a far better condition, and the interests of both masters and men more secure, if to the natural laws of trade were left the regulation of both wages and profits. But while organization and co-operation exist among the workmen, employers who are dependent upon the labor of union men must have recourse to the same expedients. Prompt and decisive action in this respect among employers would have a most wholesome moral effect at the present time, and would do much to avert the danger which now threatens our industries.

An Important Metallurgical Movement in Germany.

The following appears in the last issue of *The Engineering and Mining Journal*:

Our contemporary, *The Iron Age*, has exclusive information of the most disastrous, it is to be said, which ever befell the mining world. Speaking of the exportation of American ore, it says: "Of these ore but few have found their way into Germany, partly because of the more intimate commercial relations existing between the two countries, and partly because the latter an advantage, and partly because the supply of German ores was sufficient to employ the smelting works to some extent locally. It is a fact, however, that the mines at Andreasberg, in the Harz Mountains, began to give out, and as the transfer of the smelting works to some other locality is out of the question, owing to the fact that the workmen and their families are located there in permanent settlements, the managers of the Andreasberg works have turned their attention to the importation of foreign ores. The Royal Saxonian mines at Freiberg were the next to give out suddenly; and, later, the managers of the great Mansfeld mines, at Eisleben, have reached the conclusion that silver-bearing copper ores would have to be added to their own ore product, if their smelting operations are to be carried on to the best advantage. Under these circumstances the three mining companies, the Royal Prussian at Clausthal, the Royal Saxonian at Freiberg, and the Mansfeld at Eisleben, arranged for common action in the matter of securing larger importations of American ores, committing to the management of the Prussian Company the business part of the undertaking. This arrangement promised great advantage, for the reason that the three companies could take any kind of ore between them; the Clausthal mines, for example, could take silver-bearing or pure, the Freiberg all ores containing antimony or arsenic, and the Mansfeld all copper ores."

What! the Harz and Saxony at one blow? That is dreadful—or would be if it were true; but, fortunately for the hundreds of human beings who are directly or indirectly dependent upon those two great mining fields, it is far from the truth. The Mansfeld region has ore enough untouched to satisfy its needs for 150 years. The Clausthal mines cannot look so far ahead, but they never were so active as now, and though that activity is said to be kept up at an unwarrantable expense of their resources, their outlook is anything but disastrous. As for Freiberg, the paper finds in the last number of the *Journal* contained, in its few historical notes, enough to show that so far from "petering out" the best authorities are looking for a renewal of the former high grade of ore within a time probably not very far off. The mines of Freiberg yielded 14,646 tons of ore; Freiberg, 116,843 tons; and Mansfeld, 179,350 tons—a total of 304,839 tons. Certainly this picture is a different one from that presented by the *Age*.

The truth in regard to the treatment of foreign ores in these smelting works is, that this is an old practice, which has latterly been expanded in obedience to the wishes of the foreign miners. Producers of ore have been ready to be satisfied with British smelting works, which purchase by the ton, and none but a Cornishman can comprehend, and whose price, when it is finally figured out, is less than that given in Germany. The smelting works in the latter country buy according to the ordinary weights or measures in use in the country where the ore is mined, pay a good price for it, and treat it with the greatest care. The natural consequence of possessing so many virtues is, that they are flooded with ore and are now turning rather to improvement than to the import of foreign ore. We hope to be able shortly to print a statement of what they have received from abroad during the past six months.

We are averse to newspaper controversy, and rarely engage in discussions with our contemporaries; preferring rather to give our readers the benefit of such information as we possess, and leave other journals in the enjoyment of the same privilege. But in this instance we feel a sympathy for the readers of the *Engineering and Mining Journal*, and, for their sake, will endeavor to put our contemporary in the way of getting one item, at least, of news in which it is presumable that some of them will feel an interest. As the writer of the comments above, quoted must have seen, though he refrains from saying so, our statements regarding the condition of the three great German mines were based upon the authority of the Hamburg *Borsenhalle*, a journal of which our contemporary may possibly have heard. If not, it may be interested in knowing that the *Borsenhalle* is the leading commercial journal of Continental Europe, a high statistical authority, and very enterprising. From its issue of January 3, 1873, we make the following translation: "At the time when the mines 'at Andreasberg, in the Harz Mountains, began to decrease considerably in their

"former productiveness, it seemed unavoidable that they should be abandoned, because of the large mining population there congregated, and the gentlemen to whom the fiscal management of the mines and works was entrusted, began to turn their attention to the importation of foreign ores. It was, moreover, discovered that the Freiberg works had ceased to find in their own ores a sufficient material, and that the Mansfeld Smelting Works, for the continuance of their operations, deemed it necessary to add silver-bearing copper ores; the three managements, viz., the Royal Prussian Superior Metallurgical Establishment at Clausthal, the Royal Saxonian Directory of Mining at Freiberg, and the Mansfeld Directory at Eisleben, coming to an agreement for the joint purchase of transatlantic ores, and committing to the first named establishment the business of importation." The issue of the *Borsenhalle*, No. 18,851, from which the above is somewhat more literally than elegantly translated, is at our office, and we shall be much pleased to loan it to the *Engineering and Mining Journal*. Statistics of production at the mines in question in 1869 are interesting for historical reference, but they can scarcely be considered of great present moment, and the *Borsenhalle* speaks of matters of somewhat more recent occurrence. It is certainly to be regretted, for the sake of journalistic enterprise, that *The Iron Age* should have "exclusive information" so intimately connected with the interests which the *Engineering and Mining Journal* claims to represent.

Concerning the efforts of the German smelting companies to encourage the importation of foreign ores—at a time when, according to the *Engineering and Mining Journal*, they are aiming to "repress them," we have some information additional to that published in our issue of January 30, which our contemporary may also find interesting. Our article on this subject having attracted the attention of the officers of the Samana Bay Company, whose charter gives them the right to develop the mineral resources of all San Domingo, an effort is to be made to induce the German Commission to visit that country before returning to Europe. The route prescribed for these gentlemen includes the Spanish American republics, renowned for their mineral wealth, but not San Domingo, Hayti, or the Spanish Antilles. The United States were also omitted, it being proposed that the tour shall be completed within the current year and terminate with the River Plate countries. Since the publication of our article, however, the Samana Bay Company have manifested a lively interest in the matter, and a request will be forwarded to the United German Mining Companies that the Commissioners be instructed to visit San Domingo, where, it is believed, they will find a mineral wealth as great as that to be found in any of the Spanish countries. Possibly, if an effort is made, they may also be induced to visit the United States, in which event the *Engineering and Mining Journal* may have an opportunity to put its readers in possession of some interesting information of date subsequent to 1869, without coming to us for it.

Proposed Government Regulation of the Price of Coal in England.

The high prices now charged for coal in England, especially for those kinds best adapted to domestic use, and the growing scarcity of fuel of all kinds, amounting practically to a famine, are having the very natural effect of creating a popular demand for some form of legislation on the part of Parliament that will fix a maximum limit to prices at a point considerably below those now charged. Anxious householders are writing letters to the papers demanding all sorts of foolish things, and declaring that the government should either take possession of the mines and work them for the benefit of the people, or else interpose its authority to protect consumers from the "grasping avarice" of the mine owners, who are taxing the people beyond the limit of their ability to bear it. The subject has been brought before Parliament in several shapes, petitions praying for relief have been presented, public meetings have been held, and many other unmistakable evidences given of a strong popular movement in favor of in some way placing a legal check upon the upward tendency of the price of coal.

Whether Parliament will take any action in accordance with this demand, or whether it will leave the matter alone, remains to be seen; but it is difficult to see what benefit would result from interference. The government cannot create coals, nor can it draw them from the pits to the surface by special enactment. More than this, it cannot dig coals more economically or successfully than they are and have been dug by the mine owners, and should it attempt this experiment the people would lose vastly more in increased taxes than

they would gain in cheaper coals. The value of coal is determined by the cost of getting it out and transporting it to the consumer, and the profit charged by the operator is not, in the long run, more than interest upon the capital invested, which the public would have to pay in any case, even if the cost of the mines were added to the national debt—in which case they would have to pay for all the waste and extravagance attending work for the government. As to arbitrarily fixing prices, or fixing their maximum limit, Parliament would scarcely venture such action, even with a public demand more nearly unanimous than now. One proposition, which has met with much favor, is the levying of an export duty of 10 shillings per ton on coals sent abroad, by which it is thought the coals now exported could be kept at home for domestic consumption. This would be a less objectionable expedient than any of the others proposed, provided the coal owners were permitted to fill existing contracts; but it would be a violation of the commercial policy of the country, to which the government is not likely to consent. But such legislation is unnecessary. The high prices now obtainable at home will effectually check exportations of coal when existing contracts have expired, and any relief which the market may thus receive will come naturally as soon as it could be effected by Parliament.

The remedy for the existing state of affairs in the English coal trade, if there be any, will not be found in legislation. Its cause is an excess of the demand for coal over the supply of it; and if production cannot be augmented, consumption must be diminished. The English people have been most lavish in their consumption of coal, and the statement of Sir William Armstrong that "without carrying economy to its extreme limits, all the effects we (the British nation) now realize from coal could be attained with half the quantity we use," is not without substantial basis. Whatever the action of the miners with regard to wages and hours of labor, the time has come when the people of Great Britain must look carefully after what remains of their coal supplies, and every possible economy in its use should be observed. Stoves and hot air furnaces must be substituted for open grates and fire places, tons of unconsumed fuel must not be allowed to pour from factory chimneys, steam power must be economized, and science must lend its aid by determining how the greatest amount of available heat can be obtained from a given amount of fuel. It would be well for the people of this country if they were to learn the same lesson of economy, but in England it is an imperative necessity, and in the practice of such economy will be found the surest and quickest cure for the causes which have brought about the famine from which coal consumers are now suffering.

The old proverb, "Go from home to get the news," finds an apt application to a bit of highly interesting and important intelligence which reaches us through the medium of an English daily. "The Americans," says that journal, "have adopted a novel method of showing their appreciation of Mr. Bessemer's services to science. In the midst of one of the richest iron and coal districts in Cincinnati they have begun to build a new city, which, from its geographical position and local advantages, will probably become one of the largest centers of trade in America. To this city they have given the name of 'Bessemer.' We are not surprised that we are to have a new city in the West that is about to become one of the largest centers of trade in America"—the building of such cities is a matter of every day occurrence; but that a location so extraordinary as one of the richest iron and coal districts in Cincinnati should have been chosen, is certainly calculated to excite unqualified astonishment. Some time ago we saw a statement in an English exchange to the effect that Pennsylvania was the western portion of the State of Philadelphia, the writer being saved from making a very bad mistake by making a very good joke instead. Will not some philanthropist head a subscription to send geographies to England for general distribution.

Scientific and Technical Notes.

A California exchange describes a novelty in the shape of

AN OXY-HYDROGEN SMELTING FURNACE, in which metallic ores are exposed to the action of the oxy-hydrogen flame, which acts upon them with intense heat. The hydrogen is obtained from steam, which is taken from the boiler at a pressure of 80 pounds and passed through a series of pipes, at each turn of which is a flat metal plate. During its passage it is thoroughly disintegrated. The hydrogen is separated from the oxygen of the steam by using the carbon of coal tar, which unites with the oxygen, thus setting the hydrogen completely free. The oxygen of the air then combines with the hydrogen, and their combustion

produces an intense heat. Our California contemporary says: For the smelting of ores this furnace seems peculiarly adapted, and it will easily reduce two tons per hour of any galena ore. The heat produced is so powerful that the ores are reduced rapidly and most thoroughly. The amount of heat can be regulated as easily—and in much the same way—as can the amount of light from a gas-burner. Once regulated, there is never the slightest variation, and the work of reduction can go on without any care being paid to the furnace itself.

Regarding this device, we may remark that no heat is gained in this manner, as the heat necessary to decompose the steam is theoretically no greater than that evolved in the subsequent combination of the two gases. The only advantage obtained is the concentration of the heat in the oxy-hydrogen flame. We are also at a loss to know what is meant by the carbon of coal tar uniting with the oxygen. If the coal tar itself is used, further explanation is necessary to show how the union is accomplished without flame. If coal tar is not employed, we are unable to understand in what form the carbon is used so as to combine with the oxygen without producing sufficient heat to ignite the hydrogen.

MM. Bajault and Roche have submitted to the approval of the French Academy an IMPROVED PROCESS OF MAKING STEEL, based upon the partial decarburization of the cast iron under the influence of a rich oxide of iron. The advantage which rich ores present for the transformation of cast iron into steel has of course been long known, but the action which they exercise on the sides of the crucible has prevented their use hitherto. This inconvenience does not exist in the method of MM. Bajault and Roche. The cast iron and the ore in powder are placed in metallic molds, and are brought to a red heat in special furnaces. The reaction takes place, and fusion only takes place after their transformation. Ingots are thus obtained which are melted in the crucible, or on the hearth of a reverberatory furnace. These experiments appear analogous to those of M. Ponsart.

An interesting item of news reaches us from Canada, to the effect that a valuable deposit of

CANADIAN PLUMBAGO

has been discovered in the township of Buckingham, about eighteen miles to the north of Ottawa, the capital of the Dominion of Canada. The mines, which have been opened, are situated on the River de Leveire, a tributary of the Ottawa, and are favorably placed, both as regard the working of the ore and its transport. A recent examination of these mines, made by Mr. George Henwood, has disclosed the fact that there are fourteen well defined lodes, in which plumbago of unusual purity occurs in large quantities. Several of the lodes intersect each other, and the mineral in some of them varies in thickness from six to ten feet.

An effort is now making to increase the prosperity of Australia by the establishment of various branches of

IRON MANUFACTURE AT SYDNEY, NEW SOUTH WALES.

where there are extensive iron and coal fields which have hitherto been worked only to a sufficient extent to prove their value. According to the latest information, an almost inexhaustible supply of hematite ores, free from phosphorus, and containing from 58 to 60 per cent. of iron, can be easily obtained, whilst coal, cropping out from the hill sides, in seams from 2 ft. to 9 ft. in thickness, also abounds. Limestone, too, is plentiful in the immediate vicinity of the mines, which are about 80 miles from the town of Sydney. From the promises held out by the appearance of the mines, a new field of prosperity is opened to the colony. Already native energy and industry is rendering it comparatively free of English manufacture; but hitherto all the iron required has been exported from that country. The annual value of iron sent out to this colony from England, is over £1,000,000—an amount which, even if it were not increased by the possibility of obtaining it in the colony, would at the same time enrich the country, and encourage industry. But the demand would soon far exceed the 80,000 tons now imported every year, if the supply was close at hand, especially in the present time of high and uncertain prices.

THE HARDENING OF SWORDS

in Solingen is conducted in the following manner: The swords are placed in a coke fire, with tuyeres below, and are heated to a uniform cherry red. Before cooling, the edges are drawn through wet coal dust, whereupon the whole sword, the strong end first, is dipped into water and quickly withdrawn. When five swords have thus been treated, another man anneals them until they appear blue, testing them also in a clamp for their elasticity. Finally, they are annealed gray. The interior thus remains soft, while the exterior becomes hard.

LACQUERING ZINC SHEETS.

Various are the means proposed to obtain a durable paint or covering on sheet zinc, viz.: Tinning in the wet way, pickling with muriatic acid, in order to obtain a coarse surface, etc. Mr. Miller, painter of one of the largest dial plate factories in the Black Forest, Baden, now communicates the result of fifteen years' experience in this line to a German contemporary. He says that preliminary pickling with diluted muriatic acid is only suitable for castings. Sheets are treated as follows: The well cut and smooth faces are polished with fine wet sand or pumice stone powder, until all gray spots have disappeared. This treatment is, of course, only applied to the side to be lacquered. With regard to pigments, it should be stated that those consisting of lead, copper and iron cannot be used. It was found that, on slight bending, the pigment scaled off from dial plates that had been lacquered with Carinthian white, probably without preliminary priming. Between color

and plate there was a gray powder, probably a precipitate of lead, formed by galvanic action. Hence, for white goods, zinc white must be used, or very common white lead, containing more baryta than lead. Quickly drying colors are not applicable; use only well drying oil and lacquer varnishes with much body, and allow the goods to dry at a temperature of from 165° to 180° F. The linseed oil varnish used in combination with the pigments should not be boiled with oxide of lead (litharge), but with zinc vitriol or black oxide of manganese. For dark colors and black, Miller applied the brown varnish with success which is used for pottery. Finally, the storing of lacquered zinc articles in damp rooms damages even the best goods.

Manufactured Iron Trade of Sheffield, England.

The progress of the manufactured iron trade of the North of England keeps pace with, and almost threatens to outrun, that of the pig iron trade. It is only within recent years that this branch of the staple industry of Cleveland assumed anything like large proportions. So far back as the year 1840 there were not more than 300 or 400 puddling furnaces between Leeds and Newcastle, and in 1863 the number had increased to 646, distributed as follows:

Name of works.	No. of puddling furnaces.
Walker.	50
Gateshead.	33
Consett.	99
Bishop Wearmouth.	31
Birtley.	6
Birtley Bridge.	27
Bedlington.	14
Hive, Jarrow.	10
Sunderland (Tysack & Co.).	7
Britannia (H. Hopper).	16
Jarrow (Palmer & Co.).	30
Tudhoe.	64
Middlesborough (Bolckow & Vaughan).	68
Witton Park.	71
Tees-side (Hopkins & Co.).	50
Albert Hill, Darlington.	45
Stockton.	20
Total.	646

Within the last ten years the number of puddling furnaces in Cleveland has been more than doubled. It was calculated that the 646 furnaces above named were equal to an annual production of 840,000 tons of finished iron, whereas last year the quantity of puddled iron turned out in the district was about 1,000,000 tons. Mr. Isaac Lowthian Bell stated in a speech which he delivered last year, in connection with the meeting of the Yorkshire Union of Mechanics' Institutes, at Darlington, that there are now close on 2000 puddling furnaces at work in the North of England; that the quantity of coal required to supply these would not be short of 2,000,000 tons per annum; and that they would require the attendance of 30,000 workmen. It will thus be seen that Cleveland is fast approaching South Staffordshire and Wales as regards the extent and importance of its malleable iron trade. So far as the pig iron trade is concerned, Cleveland has already shot far ahead of those older and more famous districts.

It is fitting that the North of England, which has pioneered so many improvements in the economical use of the blast furnace, should also lead the way in the adoption of new and improved processes of manufacturing finished iron. Cleveland is responsible for the introduction into this country of Danks' puddling furnace. It was in April of last year that the Danks furnace was first put to a practical test in the Cleveland district. The trial took place at the works of Hopkins, Gilkes & Co., and was witnessed by many of the largest manufacturers in the country. The results were that Dr. Danks entered into an agreement with Messrs. Hopkins & Co. to erect a complete forge on his system, and since that time he has concluded negotiations for the use of his patent with the following additional firms: The North of England Industrial Iron Company (Limited); the Erismu Iron Company (Limited); Omos and Cleveland Iron Company; Robert Heath & Co.; Jacques & Co.; London and North Western Railway Company; Cooke, Swinerton & Co.; while several other firms are now arranging for licenses. Messrs. Hjerfield & Co., engineers, Middlesbrough, are the makers of the Danks furnace in the Cleveland district, and at present they have their hands quite full.

As regards priority, the North of England Industrial Iron and Coal Company were the first after Messrs. Hopkins, Gilkes & Co. to arrange for the use of Mr. Danks' patent. They are now having eight furnaces erected at their works at Carlton, near Stockton-on-Tees, and they are so far advanced that it is expected a commencement will be made in the course of next month. The Erismu Iron Company was founded a little more than twelve months ago. They have secured a suitable site between Stockton and Middlesbrough, immediately adjacent to the Tees, and building operations were commenced in the spring of last year. The works, which will comprise in addition to twelve Danks furnaces, all the usual appliances for the manufacture of finished iron, and probably, also, in course of time, several blast furnaces, are yet a long way from completion, but they are likely to be in operation before the close of the current year. Messrs. R. Jacques & Co., of the Richmond Iron Works, Stockton, have only erected one Danks furnace in the mean time, being anxious to test its results for themselves before proceeding further. The rest of their forge is built on the usual plan. Beside the firms already named, the West Stockton Iron Company (Limited) are building a new forge and mill; the Stockton Malleable Iron Company have just completed a new mill; Shaw, Heay & Johnson have built within the last twelve months a new forge and mill of considerable dimensions at Stockton-on-Tees; and the Vulcan Iron Company, Middlesbrough, are building ten machines with the necessary squeezers and other appliances. But all this does not represent anything like an adequate view of the real extension of the malleable and

foundry trade of Cleveland, as there are few works—perhaps not even a single exception—that have not been considerably extended within the last eighteen months, while other extensions of considerable magnitude are in contemplation.

While speaking of the development of the Cleveland finished iron trade, prominent notice should be given to the malleable works, erected in 1870-'71 by Mr. Bernhard Samuelson, M.P., and lately acquired by a limited liability company. The Britannia Iron Works are located on what was formerly a useless marsh, within a mile of Middlesbrough. The forge contains 120 puddling furnaces, and the mill is fitted up with twelve Siemens gas furnaces. The forge is capable of producing 1200 or 1300 tons per week of puddled bars, and it is on the cards to erect at some future time Bessemer steel works. The directors of the company are now considering the expediency of introducing some of Danks' puddling machines, and the general impression among Cleveland ironmasters is that mechanical puddling must ere long entirely supersede the old system. When we say mechanical puddling, we do not necessarily refer to Danks' system, for there is another rotary puddling furnace that has lately come into considerable prominence, and promises to yield highly satisfactory results. This machine is the invention of Mr. Adam Spencer, now manager of the West Hartlepool Rolling Mills. So far back as 1868, when he was mill manager for Messrs. Bolckow & Vaughan, Mr. Spencer was engaged in maturing his rotary puddling machine, but it was not until 1870 that preparations were made at the West Hartlepool works for putting it to a practical test. The patentee maintains that 5 tons per heat can easily be obtained in his converter, which will convert as much iron in a given time as 8 or 10 ordinary puddling furnaces. The proprietors of West Hartlepool Rolling Mills (Messrs. Thos. Richardson & Sons) are so satisfied with the machine that they have resolved on adopting them on a large scale, and if the results already arrived at are maintained, the forge, which now contains 114 furnaces, will be entirely constructed on Spencer's system.

At the works of the West Stranton Iron and Steel Company, another of Mr. Spencer's converters is now being erected. These works were built about two years ago for the manufacture of steel on Hargreave's system, but after a great deal of trouble and loss, the company found that Mr. Hargreave's plan was impracticable, and had, therefore, to abandon it. Since then, they have confined themselves entirely to the manufacture of finished iron, rails and puddled bar being the staple articles of produce. It is probable that the realised value of the malleable iron produce in Cleveland during 1873 is not less than £12,000,000, and by the end of the current year, if present prices are maintained, this enormous item is likely to be very materially increased.—Engineering.

Iron Ore in Wayne County, Pennsylvania.

Mr. W. R. Maffet, of Wilkesbarre, Pa., superintendent of the Wilkesbarre and Seneca Lake Coal Company, has kindly sent us a slip containing an article going the rounds of the newspaper in that region, describing a discovery of brown hematite in Damascus township, along the banks of the Delaware River. It is said to underlie the river bed and to pass over into Sullivan county, New York. Dr. Gregg, of Elmira, has analyzed the ore and found it to yield from 37 to 40 per cent. Mr. Parrott, of the Stirling Mining Company, has visited the place and is said to have pronounced it useful ore. It was discovered by Mr. Fred. Goodell on a recent visit to Calicoon, Sullivan county. He interested Mr. G. W. Rockwell, of that place, to lease meadow land and sink for the ore alongside of the Erie Railroad track, finding a bed of compact hematite. Leases of fifteen farms were made, and as many trial shafts made upon the bed of ore. The strata along the Delaware are nearly horizontal, but have a slight rise which brings them up in succession from the river bed and causes them to outcrop along the walls of rock which shut in the river on both sides—walls mountain high. If the ore bed be really of workable thickness it will be valuable, because it can be entered and mined at almost any place along the Erie Railroad for miles. Dr. Eldridge, president of the Elmira Rolling Mill Company, is said to have been sufficiently convinced of its importance to negotiate for its purchase.

We do not entertain vivid hopes of this deposit of iron ore becoming very important; and yet it deserves attentive exploration. There are two deposits of iron ore in the great formations Nos. VIII, IX, of which the mountain is composed through which the Delaware cuts its way down toward Port Jervis. One of these is the Mansfield ore bed, long known and worked with some success on the Tioga River. This bed probably lies far below the level of the river at Calicoon. Another is the Larry's Creek fossil ore bed once unsuccessfully worked in the face of the mountain northeast of Lockhaven and northwest of Williamsport. This Larry's Creek ore has been recently traced along the face of the mountain west of Bedford. It is an extensive deposit, and may reach the Delaware river. If it does, it would occupy a position very near the level of the Delaware in Wayne county, say at Calicoon. We hope the discovery of Mr. Goodell may turn out to be the rediscovery of the Larry's Creek ore bed in its far east prolongation.—Register.

THE BUFFALO FILE CO.
have placed in my hands the balance
of their stock of
FIRST QUALITY FILES,
For Sale at LOW PRICES,
G. E. WALBRIDGE,
55 Chambers Street, N. Y.

For Sale, &c.

Fire Brick Factory.

The undersigned, being desirous of retiring from active business, offers for sale his two-third interest in the Lehigh Fire Brick Works, in Catasauqua, Pa. Everything pertaining to this establishment is in first-class condition, and the demand for the Bricks has hitherto been in excess of the capacity of the Works to supply. As the Works are situated in close contiguity to nearly fifty blast furnaces and twelve rolling mills, the demand is not likely to fall off. An active business man who can come well recommended will be dealt with liberally. Apply by letter or otherwise to

DAVID THOMAS, Catasauqua, Pa.

Steam Engine.

A superior six column beam Engine,
24 inch Cylinder and 72 inch Stroke,
made by Mandalay, Sons & Field, London.
This Engine is one of the finest in the country, of great strength, and well adapted for mining or heavy factory work.

Attached to Beam are two Pumps, 36 inches diam. and 54 inch stroke, beside Well and Force Pump, also attached to Beam.

Is in perfect order, and will be sold at a reduced price, if applied for immediately.

150 feet 5 in. turned Wrought Iron Shafting,
50,000 Fire Brick, (second-hand) in good order.

R. L. & A. STUART, 169 Chambers St., N. Y.

For Sale,

The Orange County Foundry and
Machine Shop,
MIDDLETOWN, N. Y.

Established 1842.

The most desirable property on the line of the Erie and Midland Railways. Has a large and valuable assortment of Patterns. Extensive and increasing trade, and affords parties wishing to enter the Iron Business an unusual opportunity. Satisfactory reasons given for selling.

Parties desiring to purchase are requested to call and examine, or address the undersigned,
E. P. WHEELER, Middletown, N. Y.

FOR SALE.

The Napanoch Blast Furnace, Ulster Co., N. Y. Splendid water power. Charcoal and Anthracite Coal in abundance. Apply to H. B. HANCOCK,

34 Tompkins Place, BROOKLYN, N. Y.

VALUABLE REAL ESTATE.

VALUABLE REAL ESTATE

AND PERSONAL PROPERTY

AT AUCTION.

Ten Eyck Axe Manufact'g Co., Cohoes, N. Y.

The undersigned, assignee of the estate of the Ten Eyck Axe Manufacturing Co., bankrupts, will sell at public auction (unless previously disposed of at private sale) on the premises, in the city of Cohoes, N. Y., on the 13th day of March, 1873, at 10 o'clock a. m., the valuable real estate and water power recently occupied by said company. Also the valuable machinery, tools, and implements used by them in their business. Also a large quantity of edge tools in great variety, being stock of manufactured goods on hand. Also eighty-five large grindstones and other material, office furniture and fixtures, &c. &c. Must be sold without reserve to close the estate. Terms made known on day of sale, or before, on application to

F. P. ALLEN,
Assignee of Ten Eyck Axe Mfg. Co.,
325 River st., Troy, N. Y.

For Sale

By the undersigned. Sealed bids, accompanied with a good bond as security for the fulfillment of the bid in case the same should be accepted, will be received until March 1st, 1873, for the following described property:

The works of the Greenwood Scythe Co., situated at New Hartford, Conn., on the New Haven and Northampton and Conn. Western R.R., the latter within 100 feet of the works, and it is expected will soon have connection with the Poughkeepsie and Eastern at Millerton, so that coal can be transported at a very low price. The buildings consist of a Hammer Shop, 90x68 feet, and has three complete sets of Hammers; a Grinding House, 130x24 feet, with ten runs of stones, with new spindles and all the tools for handling, etc., etc.; and a polishing and paint room of sufficient size to handle twelve thousand dozen in ten working months. The buildings were erected in 1869, and are in good order. There is a 40 inch Leffel Wheel, under 22 feet head, with good gearing, shafting and pulleys, with large and small driving belts, in readiness to start at once; also an office and warehouse, 90x28 feet, three stories high, in good order, and three Dwelling Houses and a Barn.

The water power is excellent, never failing, being on the Farmington River, and below the well known Otis and West Hill Reservoirs, the latter being under the exclusive control of the company.

The Brands, Stamps, Good Will, Labies, etc. etc., of the company, such as has been in use by them since commencing business, are also included in the sale. The terms are one-third cash on delivery of deed, and the remainder in equal payments at the expiration of 30 and 60 days from the date of the deed, secured by mortgage of the property.

For further information apply to

WM. S. SEYMOUR, } Committee.
E. M. SEYMOUR, }
S. K. PRIEST, }
New Hartford, Conn.

For Sale!

Hardware Business!

I offer for sale, on LIBERAL TERMS, an old established Hardware Business, centrally located, and successfully carried on by me for over 20 years, and now doing a good, profitable business in my spacious three story brick Store, metal roof, 41 feet front on Summit Street, extending to Water Street, with splendid basement fronting on latter Street. I will rent the store on reasonable terms for a number of years. The stock is well assorted, and will invoice about \$25,000. This is a rare opportunity for anybody with limited means to step in and do a prosperous business from the start, as I am desirous to go out of business, on account of failing health, and other interests demanding my attention. Will turn over all my agencies, influence, good will, &c. Terms very reasonable. I refer to any Business House or Bank in this city. For further particulars address

HENRY PHILLIPS, Toledo, Ohio.

Rolling Mill Machinery For Sale

One train, 3 high, finishing rolls, with steam engine 75 H. P.; and balance wheel, 30,000 lbs.—complete and in good order—by

Fearing, Rodman & Swift,
23 & 25 Commercial Street, Boston.
Boston, Nov., 30, 1873.

For Sale, &c.

TO LEASE

On very reasonable terms,

A Large Factory.

On line of railway between New York and Philadelphia.

Just the Site and Building for a large
Machine Business.

Main building 150x50 feet, with two wings for Foundry and Forge

A never-failing Water Power supplies
the Factory with power.

Address, immediately,

FERGUSON,

59 White Street, New York.

To Rent or For Sale.

FACTORY, with twenty horse Water-Power, drawn from never failing Reservoir.

Building, 25x62, 3 stories, well lighted, desirably located in Connecticut, less than one mile from depot. Address

P. O. Box, 3110, New York City.

Rolling Mills For Sale or Lease.

The "CALVERT ROLLING MILLS," situated in the city of Baltimore, were withdrawn from the sale advertised on the 16th of May, and are now offered at private sale, or will be leased to responsible parties. The terms will be made advantageous. The Mills are in perfect order, and can be put in operation at short notice.

For full information address

ALEX. BROWN & SONS, BALTIMORE.

A Stove Foundry,

With Machinery, Tools and Fixtures (except Patterns), all ready for operation, located at Allentown, Lehigh County, Pa., is offered at Private Sale, on accommodating terms. It is situated between the Canal and Railroad, with extraordinary shipping advantages, by both having a frontage on each of 450 feet, and contiguous to the depots of three important R. R. Lines. It contains over two acres of ground, on which are erected a strongly-built two story brick Building, 50x60 feet, together with Casting, Engine and Boiler Houses, Office, &c., all suitable dimensions. The Engine, Boiler and Blast are more than sufficient for the purposes of the foundry, and the expense of making steam is but nominal; tan in any quantity can be had without expense a few hundred yards from the foundry. The establishment is adapted to various manufacturing purposes, and will be sold with or without the stove apparatus. For further particulars, address either of the undersigned, Allentown, Pa.

William Roth,
Wm. J. Hoxworth.

Special Notices.

Hardware Salesman Wanted.

A LARGE MANUFACTURING AND JOBBING Hardware House, in New York, wants to engage four well posted, first-class Hardware Salesmen, to travel and sell goods in the four following sections of the country, viz: Wisconsin and Minnesota, Southern and Western Indiana and Southern Illinois, Missouri and Western Iowa, Canada and the Provinces. Persons without experience or trade in either of the above four parts need not apply; as parties who are engaged will risk their time and traveling expenses. Address, with reference, I. G. Box 2137, N. Y. P. O.

Trade Register

OF

HARDWARE

And Kindred Interests.

1873.

GUARANTEED CIRCULATION.

Five Thousand Copies,

Amongst all good standing Hardware Dealers throughout the United States, payment for advertisements being required only upon proof of fulfillment of our Contract.

Will be published about February.

All Parties having anything kindred to Hardware should advertise in it.

Circulars upon application.

The Merchants & Man'rs Agency

4 Warren St., N. Y., Publishers.

CAUTION.

The public are warned against paying money in advance for the insertion of advertisements, or other matter in works published by us.

The Merchants and Manufacturers Agency,
4 Warren Street, N. Y.

Wanted,

A situation as Salesman, assistant Bookkeeper, Entry or Shipping Clerk. Have been in the Hardware Business, and can influence some out of town trade. Address Box 232, PEESKILL, N. Y.

To Manufacturers.

The advertiser is going into business ere long, and will thank manufacturers of
Stoves, Lamps, Plated Ware, Safes, Refrigerators and General Housefurnishing Hardware to forward their Catalogues and Price Lists at once.

A. REID, Buffalo, N. Y.

To Iron Masters, Mill Owners and Others.

Wanted, by a practical man, a situation as foreman of bricklayers, either in the erection or repairing of Iron and Steel Works.

Address K. Y. Z., Post Office, JOLINT ILL.

Special Notices.

To Malleable Iron Manufacturers.

CAUTION—YOU ARE HEREBY WARNED against making Coke Screening Shovels, either in whole or in part, of Malleable Iron, for any other parties than myself, as it is an infringement of Butler's Patent of June 4th, 1872.

O. R. BUTLER, Patentee,

96 Maiden Lane, New York.

HORSE SHOE IRON

Of superior quality,

MAUFACTURED BY

NEW HAVEN

Rolling Mill Co.

R. T. HAZELL, AUCTIONEER.

By R. T. Hazell & Co.,

Store No. 118 Chambers Street.

Our REGULAR SALES of HARDWARE, CUT LERY, FANCY GOODS, &c., will be held on TUESDAYS and FRIDAYS throughout the season. CASH ADVANCES made on CONSIGNMENTS without additional charge.

St. Louis

WATER WORKS,

1873.

To Machinists.

SEALED PROPOSALS,

Endorsed Proposals for

HIGH SERVICE PUMPING ENGINES

Will be received at the office of the Board of Water Commissioners, City of St. Louis, northwest corner of Eighth and Pine Streets, until 12 o'clock, noon, of

Saturday, March 15th, 1873,

for constructing and building upon and within the foundation walls provided for them, Two Double Cylinder Condensing Beam Engines, coupled to one Crank and Fly Wheel.

The Engines to be built of the form and dimensions as shown on the Plans, and described in the contract and specifications. The large Steam Cylinder to be 80 inches in diameter, and the small one to be 50 inches in diameter.

The Engines and all appurtenances to be complete and ready for use by or before the fifteenth day of July, 1874.

A statement giving the weight of certain parts of the Machine as calculated by the constructing Engineer, will be furnished on application to this office.

The amount of security required will be Fifty Thousand Dollars, and upon the award of the Contract, this security may be increased to any amount less than the total amount of Contract, if the Board so determine—and the adequacy and sufficiency of the securities offered will be determined by the Board of Water Commissioners.

N. B.—Bidders for this Engine should strictly adhere to all the requirements set forth in the printed proposals attached to the form of Contract and Specifications. The drawings can be examined, and the form of Contract and Proposal with specifications attached can be obtained at the office of the Chief Engineer, room No. 6, corner of Eighth and Pine Streets, St. Louis, and also at the office of Mr. RUMPF, Constructing Engineer, West Point Foundry, Cold Spring, New York.

Also, at the same time and place, Proposals will be received from Engine Builders, who desire to submit their own designs for a Pumping Machine capable of pumping twenty-four (24) Million U. S. Gallons in twenty-four hours. Provided, however, that if the Board does not approve the design of the Engine, the bid shall not be considered, and, furthermore, that final decision on any proposal accompanied by the designs of the bidders, even if the price and general plan should be found acceptable by the Board, may be deferred until full Drawings and Specifications have been submitted to the Board for approval.

All Proposals, based upon any designs other than the design submitted by the Board, must be accompanied by a Certified Check to the amount of Ten Thousand Dollars (\$10,000), as security that the party making the bid will accept and sign the Contract if awarded to him. (If the bid is accepted, contract will be drawn in accordance with proposal). Said Check is to be returned to each of the parties bidding, in the event of the contract not being awarded to him, and to the successful bidder, after the Contract, with approved security, is duly signed.

All such proposals shall also state the time at which said Engine will be completed.

The Board reserves to itself the right to reject all bids, should it deem it to the interest of the city of St. Louis to do so.

For any further information, apply at the office of the Board.

JOSEPH BROWN,
Mayor and Ex-officio President.
ROBERT M. BENICK,
Acting President.
HENRY FLAD,
WM. H. STONE.

Attest:
ASHTON P. JOHNSON, Secretary,
St. Louis, February 1, 1873.

Board of Water Commissioners.

are looking for an end to the Scotch impossibilities. But if an end do not come at once, Scotch Iron will be dispensed with—the supply of American being abundant; the increased production of American being 25 per cent. last

year alone, while that of the present year will amount to fully 30 per cent. more by December next. We quote No. 1 extra, \$50 No. 2 extra, \$48. Gray Forge, at Hoboken or on the Hudson, \$40 to \$45 per ton. White and Mottled Iron, \$36 to \$40 per ton, holders being firm and the market strong. In Forge Pig Irons, which have been so long dormant, a moderate advance is looked for, particularly in view of the many rail and iron contracts now being placed.

SCRAP IRON.—Higher; holders demand from \$57 to \$60. Sales few and the yard stocks large. OLD RAILS.—\$55 to \$57.50. Stock on seaboard, 15,000 tons; foreign holders firm; transactions few; about 14,000 tons Lake Superior prove to be of incalculable value, and will furnish a vast supply of ores varying from 30 per cent. to 35 per cent. Tin. Shipments will commence this year.

SPELTER.—In active speculative request; we quote at 7½¢. to 7¾¢. gold, for fine Silesian. The supply here and on the way is liberal.

NICKEL.—Quiet, but prices again higher; the demand, however, is so heavily checked that prices may decline. We quote \$2.50, gold.

PHILADELPHIA.

Messrs. LLOYD, SUPPLEE & WALTON, under date of March 4, write us as follows: Trade remains about the same as when we last wrote. Some of the houses are quite active, and feel encouraged for the future months of spring. We hear considerable complaint in regard to remittances coming in slowly. The month of March, however, is not a month we can rely upon prompt remittances from the local trade. Money changes hands more freely immediately after the 1st of April, and thirty days from this should show quite a different feeling. The demand for certain kinds of goods has been exceedingly heavy during the week. Trace Chain and Sheep Shears have been in active demand, and prices are held firm upon them. So far as we can learn, there will be no overstock in either this season. The stock of German Sheep Shears is also quite light, and only certain numbers can be had in any respectable quantities. There have been some slight concessions made in certain kinds of agricultural implements during the week. In the way of an extra discount for large quantities. The stock of these goods is quite ample for spring trade, and Forks and Rakes will no doubt be sold at a small margin of profit during the season. The excitement upon Rules has somewhat subsided. The city retail trade have either bought or are buying in sufficiently large quantities to carry them through the year, consequently many large sales have been made by the jobbers. Many large orders have also been taken on Strap and T Hinges during the week, at the reduced price of 15 per cent. discount.

PITTSBURGH.

PITTSBURGH, March 1, 1873.—Trade generally, is improving slowly; and while it is not what it was expected it would be, or usually is, at this particular season of the year, owing to the continued cold freezing weather and stringency in money matters combined, it is, as already intimated, improving, and the indications are that there will be a brisk demand for all descriptions of Pittsburgh manufactures during the next four months. The Pig Iron market continues quiet, and in a general way presents but little that is really new or important, as has been the case for some time past. The demand is restricted mainly to supplying immediate wants, while in regard to prices, there is no quotable changes as compared with last week. The great drawback is the difference between the views of buyers and sellers in regard to the future market. The former are holding back in anticipation of lower prices, while the latter are very indifferent, especially as regards good Irons, about selling, even at present prices. Good standard Open Gray Red Short Irons are scarce, and as it is most sought after, it is held firmly at full prices; some 1300 tons were sold this week, mostly in small lots at \$43.4 months, and on lots of choice, for future delivery, brought \$44. Common Irons, such as Mottled and White, are in good supply, the mills are well stocked, and this causes considerable inquiry for Red Short, as it is wanted for mixture. Mottled and White Irons are quotable at \$37 to \$38, according to quality. Foundry Irons are quiet and unchanged—the demand is mainly for small lots; prices are firm but unchanged. Sales of No. 1 to extra at \$46 to \$48. No. 2 at \$43 to \$44, and No. 3 at \$40 to \$41. These kinds of Irons are much cheaper here than in the East, which would indicate that, for the present at least, we are not governed by the Eastern market; we are getting our supplies nearer home. The general indications are that good Irons, being in light supply, will rule firm all season, perhaps go higher, while the commoner grades are not likely to fluctuate much either way. The market for refined Bar continues slow, although it is improving. Our manufacturers report that orders have commenced to come in more freely, and in consequence of the difficulty in making collections and low prices, they say that there hence they are making no special effort in that direction. They claim that the raw material is higher, relatively, than the product, and that 4 cents for Merchant Bars and \$40 to \$43 for metal not hang together well. The Nail trade has improved very much within the past week, or rather since the reduction in prices, and the indications are that it will continue brisk for some time to come. The Steel mills are all busy, and seem to have about all they can do to keep up with their orders. The demand at present is mainly for the finer grades used in the manufacture of tools. There is no change whatever in prices, but the indications are up in sympathy with the raw material. The Steel trade of Pittsburgh never was so prosperous as it was in 1872, and there is every prospect that 1873 will exceed 1872. Trade in Window Glass is late, but it has commenced to pick up, and our manufacturers anticipate a lively business from this out; stocks all over the country are known to be light, and once the cold weather subsides, which cannot possibly be much longer delayed, a largely increased demand is almost certain. No change in the card, and the discount remains unchanged, 50 and 10 for round lots, with an occasional sale at 60, straight.

BOSTON.

MARCH 1.—The Iron market is without much change, the demand being fair. Prices are very firm, and tend upward, though the ruling bottom price for ordinary sizes of refined Bar is \$105 per ton. The English continues to be very firm, and prices are so high as to exclude all orders from Boston houses, which will supply their wants for the present from American mills, buying, as a general thing, only as they are compelled to in order to fill their orders. Pig Iron is very firm, for both American and Scotch, but we do not change our last week's

quotations. The demand for Pig continues quiet. We quote yard lots of American Pig Iron at \$55 per ton, including No. 2 extra at \$53, and No. 1 at \$55. Scotch is held firmly. We quote Eglinton at \$58. Coltness at \$61 @ \$62, Gartsherrie at \$61 @ \$62. American and English Bar are selling fairly at \$105 @ \$117½ per ton for the ordinary sizes, and \$125 @ \$150 for extra sizes, according to size. Cast Steel is selling at 16c. for English, gold, 18½¢, currency, and 16c. for American, currency, with fancy brands of English selling at 17c., gold. Anchors are selling at 8½¢ per lb.; Chain Cables (¾" @ 3 inches thick) at 7½¢ to 8½¢, lb. Coll Chains, 7½¢, @ 16c., from 3-16 to 1-4 inches. Boiler Plates remain steady. We quote at 7½¢. @ 8c. for flanges, 5½¢, @ 6c. for C No. 1, and 5½¢, @ 5½¢, per lb. for common and tank. Russia Sheet is steady at 18c. @ 19c., gold, and 22c., currency, for perfect lots. English and American do, is very firm and selling at 6½¢, @ 8½¢, per lb., currency. Galvanized Sheet Iron remains steady and quiet at unchanged prices. We quote No. 30 at 12c.; Nos. 31 to 34, 14c.; Nos. 35 and 36, 14½¢; No. 37, 15c.; No. 38, 16c. Nails are in fair demand, with sales at \$5.50 for 10d to 6d, and other sizes at a range of \$5.75 @ \$9.50 per 100 lbs. Horse Nails, 28c. for No. 7. —Commercial Bulletin.

LOUISVILLE.

Mr. GEO. H. HULL, under date of March 3, writes us as follows: The Pig Iron market opened firm, and has continued moderately active during the week. There is a strong tendency to outside figures on nearly all grades. The usual time, four months, is allowed on quotations below:

HOT BLAST CHARCOAL.	
No. 1 Fdry, from Hanging Rock Ores.	\$55.00 @ 56.00
" " " " " "	53.00 @ 54.00
" " " " " "	51.00 @ 52.00
" " " " " "	49.00 @ 50.00
" " " " " "	47.00 @ 48.00
" " " " " "	45.00 @ 46.00
" " " " " "	43.00 @ 44.00
" " " " " "	41.00 @ 42.00
" " " " " "	39.00 @ 40.00
" " " " " "	37.00 @ 38.00
" " " " " "	35.00 @ 36.00
" " " " " "	33.00 @ 34.00
" " " " " "	31.00 @ 32.00
" " " " " "	29.00 @ 30.00
" " " " " "	27.00 @ 28.00
" " " " " "	25.00 @ 26.00
" " " " " "	23.00 @ 24.00
" " " " " "	21.00 @ 22.00
" " " " " "	19.00 @ 20.00
" " " " " "	17.00 @ 18.00
" " " " " "	15.00 @ 16.00
" " " " " "	13.00 @ 14.00
" " " " " "	11.00 @ 12.00
" " " " " "	9.00 @ 10.00
" " " " " "	7.00 @ 8.00
" " " " " "	5.00 @ 6.00
" " " " " "	3.00 @ 4.00
" " " " " "	1.00 @ 2.00
" " " " " "	0.00 @ 1.00

BALTIMORE.

Messrs. WYTHE & BROTHER, Iron and Steel merchants, corner of South Charles and Lombard streets, report us the following prices, under date of March 4, 1873: Trade has been quiet, and there is a total absence of inquiries for good orders; anticipated Horse Shoes have advanced during the past week 3½¢, and present quotations for Refined Bars must soon follow.

AMERICAN REFINED BAR IRON.	
1 to 6 wide by ½ to 1 thick.	4½¢ to 4¾¢ per lb.
1 to 4 wide by 1½ to 2 thick.	4½¢ to 4¾¢ per lb.
Round and square, ordinary sizes, from ½" to 3" inclusive.	4½¢ to 4¾¢ per lb.
Hoop Iron, 1½ wide and upward.	5½¢ to 6 c. per lb.
Band Iron, from 1½ to 4 in. wide.	5 to 5½¢.
Horse Shoe Iron ½ to 1 wide by ½ to 1 thick.	5½¢ to 5¾¢.
Norway Nail Rods.	7½¢ to 8 c. to 8 c.
Black Diamond Cast Steel, Flats, Squares and Octagons, ordinary sizes.	17c.
Machinery Steel.	13c.
Cast Spring Steel.	11c.
Homogeneous Steel Plate.	11c.
Perkins' Horse Shoes, per keg of 100 lbs.	\$6.25
Mule Shoes.	7.25
Common Horse Nails, from 14c. to 18c. per pound.	
Painam Horse Nails.	23 24 25 26 28c. per lb.
R. R. Spikes.	5½¢ by 9-16 at 5½¢ per lb.

CINCINNATI.

Messrs. ADDY, HULL & Co., under date of March 1, write us as follows: There is no change to note from last report. Prices unchanged, though firm. Receipts continue good. There has been no special activity in any grade, and the market has ruled quiet and steady throughout the week.

HOT BLAST CHARCOAL.	
Hanging Rock No. 1.	\$55.00 @ 56.00—4 mos.
" " " " " "	53.00 @ 54.00—4 mos.
" " " " " "	51.00 @ 52.00—4 mos.
" " " " " "	49.00 @ 50.00—4 mos.
" " " " " "	47.00 @ 48.00—4 mos.
" " " " " "	45.00 @ 46.00—4 mos.
" " " " " "	43.00 @ 44.00—4 mos.
" " " " " "	41.00 @ 42.00—4 mos.
" " " " " "	39.00 @ 40.00—4 mos.
" " " " " "	37.00 @ 38.00—4 mos.
" " " " " "	35.00 @ 36.00—4 mos.
" " " " " "	33.00 @ 34.00—4 mos.
" " " " " "	31.00 @ 32.00—4 mos.
" " " " " "	29.00 @ 30.00—4 mos.
" " " " " "	27.00 @ 28.00—4 mos.
" " " " " "	25.00 @ 26.00—4 mos.
" " " " " "	23.00 @ 24.00—4 mos.
" " " " " "	21.00 @ 22.00—4 mos.
" " " " " "	19.00 @ 20.00—4 mos.
" " " " " "	17.00 @ 18.00—4 mos.
" " " " " "	15.00 @ 16.00—4 mos.
" " " " " "	13.00 @ 14.00—4 mos.
" " " " " "	11.00 @ 12.00—4 mos.
" " " " " "	9.00 @ 10.00—4 mos.
" " " " " "	7.00 @ 8.00—4 mos.
" " " " " "	5.00 @ 6.00—4 mos.
" " " " " "	3.00 @ 4.00—4 mos.
" " " " " "	1.00 @ 2.00—4 mos.
" " " " " "	0.00 @ 1.00—4 mos.

SAN FRANCISCO.

FEB. 21.—Hardware.—Extensive preparations are being made by representative leading houses for a large trade this year, and from present indications they are well disappointed. Prices for staple goods remain as heretofore. Metals.—There is an improved tone to the Pig Iron market; during the current month upward of 500 tons Scotch have been sold from the wharf at rates ruling from \$50 @ \$52.50, and at this date holders are very firm in demanding \$55 @ \$57.50, and some importers demand even \$60 per ton. We are not aware of any purchases of other leading staples, nor of any material change in rates. Prices as heretofore, excepting Tin Plate, which, for lack of any considerable demand, are in favor of the buyer. The steamship Costa Rica, for Panama, carried en route for New York 4000 pigs "Selby's" Lead—say 215 tons.—Com. Herald.

FOREIGN.

Messrs. J. Berger Spence & Co., London, Glasgow and Manchester, under date of Feb. 17, 1873, report:

Metals.—The present extraordinary state of the coal trade is having its natural effect on the correlative branches in this market, and if any further advances have to be submitted to, it appears likely that the climax will result in a cessation from work in many of our industries connected with the metal trade. A further advance has been made in the price of Scotch Pig Iron Warrants, and the stock which at the end of last year stood at 100,919 tons, is now reduced to about 90,000 tons. In the Middleborough district the smelters have their order books well filled, and makers of manufactured iron are experiencing great difficulty in obtaining their regular supplies of fuel, so much so that it is reported several of the puddling furnaces will be compelled to cease working unless better provision can be made for their requirements. In South Staffordshire a similar state of affairs prevails, and makers are becoming very chary of entering into contracts except for limited quantities. There is a slight improvement in

the value of Copper, but the large stock still keeps down prices. The charters for the first fortnight in January are reported as 1800 tons—1000 tons of fine and 800 tons of Ore and Regulus. In Tin there is not much doing, and no alterations in rates. For Lead the demand continues good, and buyers have some little difficulty in obtaining regular supplies. Spelter is very firm, and full prices are readily obtainable.

IRON.—"Ayresome" Yorkshire Pig Iron, nominal, No. 1, 122 6; No. 2, 117 6; No. 3, 115; No. 4 (Foundry), 114; No. 4 (Forge), 114 net cash, or 2 extra 4 months' bills. Scotch Pig Warrants, 137 to 138. Staffordshire Bars, £13. 10 to £14. Hoop Iron, £14 to £15. Gas Tubes, 30 per cent. off new list. Boiler Tubes, 5 per cent. premium.

COPPER.—Nominal. English Tough Ingots, £93 to £94. Chili Bars, £86 to £87. TIN.—English Ingots, £147 to £148. Straits, £143 to £144.

TIN PLATES.—Best Coke, I. C., 38/ to 40; Charcoal, I. C., 43/ to 45 per box. LEAD.—Best English Soft Pig, £23. Refined Red Lead, £25 to £27.

ANTIMONY.—French Star, £62 to £64. SPELTER.—Silesian, special brands, £25 to £25. 10. English, best brands, £25. 10.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending March 4, 1873:

Hardware.	
Alburtus G. W.	Chains, cables, 4
Packages, 5	
Baker Hermann & Co.	Mdse. pkgs., 5
Cases, 9	
Smith G. & Co.	Cases, 1
Beam & Murray	Chains, cks., 59
Packages, 1	
Bruce & Cook	Wire, 21
Cooper, Harris & Hodg-	kings,
Packages, 5	
Cockayne J. W.	Cutlery, cks., 2
Congreve Chas. & Son,	Mdse. pkgs., 30
Grossman W. & Co.	Cases, 5
Degraw, Aymar & Co.	Chains, 4; cks., 2
Dickinson Henry	Cases, 6
Dolge Alfred	Fire, 3
Field A. & Co.	Packages, 38
Anvils, 128	
Chains, cks., 8	
Cases, 8	
Hilger E. & Sons	Mdse. pkgs., 11
Harnar Wm. & Co.	Mdse. pkgs., 5
Hildick	Anvils, 50
Mdse. pkgs., 2	
Chains, cks., 8	
Harnar, Hayes & Co.	Mdse. pkgs., 8
Johnston J. C. & Co.	Cases, 5
Kentworthy T.	Cases, 5
Lau & Garlicks	Mdse. pkgs., 25
Cases, 3	
Lawton & Lenox	Chains, 10
Lamarque H.	Nails, kegs, 39
Lieberich V.	Wire, cks., 16
McIntosh Williams & Co.	Cases, 3
Moore Henry	Files, cks., 15
Meyers I. T. & Co.	Cases, 2
Noyes, White & Co.	Packages, 1
Russell & Erwin Mfg.	Co.
Robbins Chancery & Co.	Cases, 2
Mdse. pkgs., 1	
Sandheim B. & Co.	Cases, 3
Schoverly & Daly	Mdse. pkgs., 3
Smith, Cohn & Co.	Cases, 4
Turner R. A.	Chains, 1
Mdse. pkgs., 10	
Van Nest A. R. & Co.	Packages, 4
Van Wart & McCoy	Bundles, 250
Waelaer & Dwyer	Nails, bbls., 186
Ward Aniline	Mdse. pkgs., 3
Western Union Tel. Co.	Gal. wire, lots, 430
Wiebach F.	Mdse. pkgs., 43
Chains, cks., 47	
Order	Packages, 5
Wire, coils, 25	
Cases, 4	
Cutlery, cases, 1	

Steel.	
Cockayne J. W.	Bundles, 108
Cases, 7	
Cooke J. & McCulloch & Co.	Bessemer rails, 130
Hogan John	Bundles, 23
Cases, 32	
Cases, 6	
Haligh J. Lloyd	Bundles, 372
Hughes Chas.	Cases, 5
Cases, 5	
Moore Henry	Cases, 2
Moss F.	Bundles, 6
Cases, 13	
Naylor & Co.	Bessemer fish plates, bbls., 192
Aries, 504	
Mdse. pkgs., 127	
Tires, 12	
Cases, 13	
Owen A.	Bundles, 69
Prosser T. & Son	Mdse. pkgs., 364
Pierce & Co.	Cases, 2
Bundles, 600	
Slagz Joseph	Mdse. pkgs., 306
Sandheim Geo. & Co.	Bundles, 15
Cases, 18	
Tyng & Co.	Bundles, 57
Cases, 17	
Van Wart & McCoy	Bundles, 924
Wardlaw W. C.	Bundles, 53
Waddell S. & Co.	Bundles, 250
Order	Bundles, 882
Bars, 5	
Springs, 16	
Bessemer rails, 1692	

Metals.	
Bruce & Cook	Mdse. pkgs., 654
Tin plates, bxs., 1105	
Baring Bros. & Co.	Lead, pigs, 1750
Lead, pigs, 1750	
Bundles, 115	
Dickerson J. S. & Co.	Tin plates, bxs., 3919
Antimony, cks., 15	
Tin ingots, 400	
Fernandez & Calvo	Scrap, copper, cks., 13
Harley Geo.	Scrap, pigs, 24
Harley Geo.	Lead, pigs, 2000
Howland & Aspinwall	Bare, 914
Lamarque H.	Zinc, bbls., 16
Naylor & Co.	Tin plates, bxs., 1640
Phelps Dodge & Co.	Tin plates, bxs., 9800
Copper, cks., 301	
Salomon A. H. & Co.	Scrap, pigs, 2
Order	Tin plates, bxs., 6596
Scrap, pigs, 4; cks., 34; bxs., 62; per, 375	
Spelter, plates, 1966	
Copper, ingots, cks., 34	
Lead, pigs, 796	
Copper, cks., 1195	
Copper, pigs, 24	
Tin ingots, 600	
Without bills of lading.	
Tin plates, bxs., 40	
Type, bxs., 6	

The Strike in South Wales.

LONDON, March 4, 1873.—The Iron workers of Merthyr-Tydfil have signified their willingness to resume work at the old rate of wages until the end of the present month, if an advance of 5 per cent. is guaranteed from April 1.

LATER.—The men on strike in Merthyr-Tydfil, at a meeting to-day, resolved to go back to work on the masters' terms for two weeks, and trust to the masters' honor for an advance of wages for the third week. It is probable that this action will bring the long strike to an end.

The foundry of the arsenal at Turin, in Northern Italy, has turned out a cannon weighing 38 tons. It is composed of a composition of iron and zinc strongly ribbed with numerous bands of steel.

Heavy Product.—The Lackawanna Iron and Coal Co.'s rail mill at Scranton, Penn., made, during the month of February, 4260 tons of rails, exclusive of condemned and second quality, being an average of 1065 tons per week. Within the last seven weeks this mill has made single weeks of 1090½, 1114½, 1014 and 1060 tons, and this has been done on a single 19 inch rail train, with a 52 pound rail, 30 feet long. The superintendent of this mill is a son of the late J. H. Scranton, of Scranton.

OUR ENGLISH LETTER.

Review of the British Iron, Hardware, and Coal Trades.

(From our Special Correspondent.)

SHEFFIELD, Feb. 10, 1873.

The leading topic of conversation in this country at present is the coal question, which has, in consequence of the unprecedented prices now charged, but never in the history of Great Britain before recorded, forced itself to the front. As a matter of course, it is essentially a matter of pregnant interest to every household who finds his income thus suddenly burdened with an impost of the most serious nature. He is also taxed in other and less direct ways from the same cause, seeing that dear coal means dear iron—and who can specify how many articles of domestic use there are into the composition of which that precious metal does not largely enter? In the metropolis the coal dealers are asking about 50s. per ton for best house coal, that price being 10s. advance on the quotations of last week. The London newspapers comment strongly upon this alarming increase, and the general public vents its just indignation in various unavailing ways. In Sheffield—which is built on beds of coal and literally constructed on combustible foundations—best household coals are realizing 24s. per ton—exactly double the price current two years ago. At Newcastle, coal of medium quality fetches 20s. per ton, and at Birmingham 20s. to 22s. for the same quantity. Steam coal is proportionately dear and scarce, but in that respect the manufacturers have to fight their own battles with the colliery owners. Public opinion is only aroused by touching the pocket of the public generally—not that of a class. The press throughout the kingdom appears to be waiting for some kind of cue—to adopt the official parlance—wherefrom they may suggest, elaborate, and recommend a remedy. They, as representing the general public, are very properly indignant at the extortionate prices charged by colliery proprietors, but their ill-defined free trading notions prevent them from advocating the one, and only, remedy available. It is, to put a heavy, in fact prohibitive, duty on the export of coal and other fuel from this country. That would bring down prices at once, and so relieve the public at large, as well as assist to rid the manufacturers of the "old man"—not "of the Sea"—which they have now on their shoulders. It must, sooner or later, come to this. A speech delivered by Sir Wm. Armstrong, at Newcastle-on-Tyne, last week, is so apropos to the point in question, that I give you it at some length. He said:

"For many years past the consumption of coal has been increasing at the rate of about 4 per cent. per annum, computed in the manner of compound interest. We are all familiar with the cumulative effects of compound rates of increase; and it is easy to see that if the consumption of coal continued to advance at this rate we should speedily arrive at impossible quantities. Thus, in 18 years our present enormous consumption would be doubled; in 36 years it would be quadrupled, and in 54 years it would be eight times greater than at present. It is clear, therefore, that our consumption has been increasing at a rate which could not possibly last. The hours of mining labor in this district 25 years ago were nine per day. At a subsequent date they were reduced to eight, then to seven, and, finally, to six. I do not suppose that the average output per man has fallen off proportionately to the reduction of hours. The men work hard—even harder than formerly—while at their post; but it is impossible that so great a reduction of working time can have taken place without lessening the output, per head, as to neutralize, in a great degree, the increase of production due to the numerical growth of the mining population. Under these two conditions of increasing consumption and restricted labor, we have reached a point at which the demand has overtaken the supply. The situation is a grave one, and the public have not yet fully realized how grave it is. Taking the present consumption at 110,000,000 tons (exclusive of exportation), and estimating the extra price to consumers at 8s. a ton over all the annual loss to the community from the additional cost of fuel amounts to £44,000,000 sterling. Had a government tax of £44,000,000 been levied upon coal, in addition to existing taxation, the effect would have been regarded as utterly ruinous, not only in regard to its prodigious amount, but on account of its repulsive effect upon every kind of production. Yet it is a fact that we are now paying the equivalent of such a tax, with this unfavorable difference—that the money does not go into the coffers of the nation. Whether it chiefly goes to coal owners or coal miners is a question which I need not discuss; but I may observe that the restrictive action of the men has benefited their employers as well as themselves, and that the public are the only sufferers. Coal owners have long been aware that limitation of quantity was the only effectual mode of raising prices, but they have never been able, by their own action, to maintain a restricted production. At last their workmen have done it for them, and we see the result. It is vain to appeal for relief, either to coal owners or coal miners. Self interest is the ruling principle of trade, and it is visionary to expect that men will sell either labor, or the produce of labor, for less than the market price. However generous a man may be, he will not exhibit his generosity by selling an article below its value. Speaking, then, as one of the public and not as a coal owner, I say we must strive to economize the use of coal; speaking as president of an institution of mining and mechanical engineers, I say we must endeavor to make up for the deficiency of human labor by a more extended use of machine labor. The consumption of coal takes place under three great divisions, each absorbing about one-third of the whole produce: 1st, domestic consumption; 2d, steam engine consumption; and 3d, iron making and other

Messrs. Barrow's price for bars is £13, and Lord Dudley, £14 2s. 6d. Hoops, which are in better demand for the United States, are realizing (at Birmingham) £13. 10s. to £15; tube strip, £14 to £16, and nail iron, £12 to £14.

Pig iron is very scarce and firm in price. Messrs. Ward, Messrs. Addenbrook, Messrs. Fowler and Messrs. Hickman (all leading houses) have none to sell, and do not care to quote. In the East Worcestershire district alone it is stated the demand for pig exceeds the supply by 4000 tons per week, and as a matter of course prices are going up. The inquiry for finished iron is improving in the district under notice, and should orders be equal to inquiries, prices will possibly go up yet higher. From the United States a few specifications for iron have come to hand, and from France, Germany and Holland for machinery and tubing. Italy, Greece, and Southern Europe generally, are still taking a fair quantity of agricultural implements. One of the sequences of higher prices is a revision of price lists and discounts of heavy hardware—galvanized sheets, iron wire, malleable iron castings, and the like. Iron-wood screws have, on the contrary, been reduced for the English market, the discount having been made 40, instead of 30, per cent. The monopoly of this branch is held by Nettlefold & Chamberlain, whose productive powers are now so extremely large that they must perforce lower prices in order to keep their establishment going. There is an excellent demand for wire for fencing and telegraphic purposes, as also for gas, water and other pipes and boiler tubes. Nut and bolt makers are strenuously endeavoring to clear off the great lot of orders which had accumulated during the seventeen weeks' strike, and the whole of the miscellaneous trade of Birmingham, Wolverhampton, Dudley, Walsall, Willenhall, and other towns of the Black Country, remain in a healthy state. The general metal market at Birmingham is decidedly somewhat weaker, transactions being on a very limited scale. Copper is lower than last week. Chili Bar is worth £26. 10s. to £27; Wallaroo, £29. 10s. to £32; English, unchanged. Tin is quiet; Straits realize £143. 10s. to £144; Billiton, £141. 15s.; Banca, £147; and English, £146. Spelter is firm, common Sillesian being worth £25 at outputs; W. H., £26; Rhenish £24. 10s. to £24. 15s. both at London and outputs, and English £25. 10s. to £26, delivered in Birmingham. Lead is firm, but not in great demand. The stock of spelter at London is 584 tons; Hull, 700 tons, and Grimsley, 280 tons. The figures given hereunder, are taken from Messrs. Rogers & Co.'s Birmingham circular, and refer to copper.

The Chili charters for 1872, including 1000 tons advise for the last half of December, were 43,040 tons. The shipments and charters together were 50,201 tons, of which it is computed 2046 tons will figure in the shipments of 1873.

The estimated stock on the 10th December was 3622 tons, and as 1000 has since been chartered, it leaves a stock of 2622 tons, against 10,750 tons, 1st January, 1872. The imports into England for the five past years, were as follows:

1868.	1869.	1870.	1871.	1872.
Tons.	Tons.	Tons.	Tons.	Tons.
62,382	64,274	61,082	54,116	62,413

The exports for the twelve months, for the following years, were:

1868.	1869.	1870.	1871.	1872.
Tons.	Tons.	Tons.	Tons.	Tons.
56,614	52,901	50,173	54,610	48,273

The positions from 1st February, 1872, to 1st February, 1873:

	Price.	Stock.	Inc. and chartered.
February 1st, 1872.	£25	19,563	tons, 31,343
March 1st, " "	26	20,447	31,137
April 1st, " "	27	19,597	31,137
May 1st, " "	28	21,435	31,137
June 1st, " "	29	21,595	31,137
July 1st, " "	30	22,318	31,137
August 1st, " "	31	27,728	31,137
September 1st, " "	32	27,522	31,137
October 1st, " "	33	29,342	31,137
November 1st, " "	34	29,940	31,137
December 1st, " "	35	30,753	31,137
January 1st, 1873.	36	32,001	31,137
February 1st, 1873.	37	32,432	31,137

And the comparative positions at the same date of the past four years, with the present:

	Price.	Stock.	Inc. and chartered.
February 1st, 1869.	£24	22,142	tons, 31,343
February 1st, 1870.	25	31,137	31,137
February 1st, 1871.	26	31,137	31,137
February 1st, 1872.	27	31,137	31,137
February 1st, 1873.	28	32,432	31,137

At Sheffield the steel trade remains fairly busy. The Association of Steel and Iron Manufacturers, to which I have more than once alluded, does not appear to have effected much, and has no deterrent influence on the coal owners, who continue, much as heretofore, to advance coal and coke when they think proper. The Steel Manufacturers Association has, however, got so far as to fix the subscription of each member at 5s. for each melting boiler and converting furnace in his possession, whether in use or not. This, it must be confessed, is a step forward, but I don't precisely understand how they propose to mollify the obdurate coal owners. I have before said, we shall see. I repeat the observation. In the heavy iron trades there is a prevailing briskness—not observable in the cutlery branches of business—and in the Bessemer departments great activity prevails. For files and saws the inquiry is hardly so well sustained as heretofore, but edge tools and sheep shears are being very largely turned out. The rail mills are going night and day, prices ranging from about £11 to £11. 10s. The whole of the works in South Yorkshire are busy, many of them now using North Lincolnshire ore. Best Yorkshire bars are worth £14 to £14. 10s., and sheets £17 to £18, hoops ruling at £12 to £14. In the Cleveland district an unparalleled amount of activity exists. Makers' stocks have decreased 6000 tons, No. 1 being now worth £6. 7s. 6d. to £6. 10s., and No. 2 £5. 10s. to £6. 10s. Average quotation for rails are £12 to £12. 10s.; angles, £13 to £13. 10s.; merchant bars, £12. 10s. to £12. 15s.; puddled bars, £9 to £9. 5s., and ship plates, £14. So difficult is it to carry on business at a profit in the face of the rapid increase in the prices of fuel and pig iron, that some of the Middlesex finished iron makers contemplate discontinuing their operations for a time. This desperate resort will, however, not need to be taken, should the price of finished iron be forced up in proportion. Shipbuilders continue busy. The Scotch market has been unsettled during the week, quotations for warrants having gone up as high as 13s., but have since somewhat receded. The stock of pig now in Scotch stores is 93,700 tons, with warrants in circulation for 75,100 tons, but as the blast furnaces are all getting partly to work again, we may reasonably anticipate a fall in prices, not, however, to their normal condition. Quotations for makers' brands of Scotch pig are: Garthburie, No. 1, 13s. 6d., No. 2, 13s. 6d.; Colless, No. 1, 13s. 6d., No. 2, 13s. 6d.; Carnbroe, No. 1, 14s. 6d., No. 2, 13s. 6d.; Langloan, No. 1, 14s. 6d., No. 2, 13s. 6d.; Glengarnock, No. 1, 14s. 6d., No. 2, 13s. 6d.; Eglington, No. 1, 13s. 6d., No. 2, 13s. 6d.; Dalmeilington, No. 1, 14s. 6d., No. 2, 13s. 6d.; Carron, No. 1, 15s., No. 2, 14s. 6d.; No. 3, 13s. 6d.; and Kinnell, No. 1, 14s. 6d., No. 2, 13s. 6d. Shipments for the week still show a slight decrease. The malleable iron trade is in a dull condition. Plates, bars and angles are in request, and the ships yards have plenty of work. Otherwise, there is nothing specially noticeable in the state of the iron trade "North of the Tweed."

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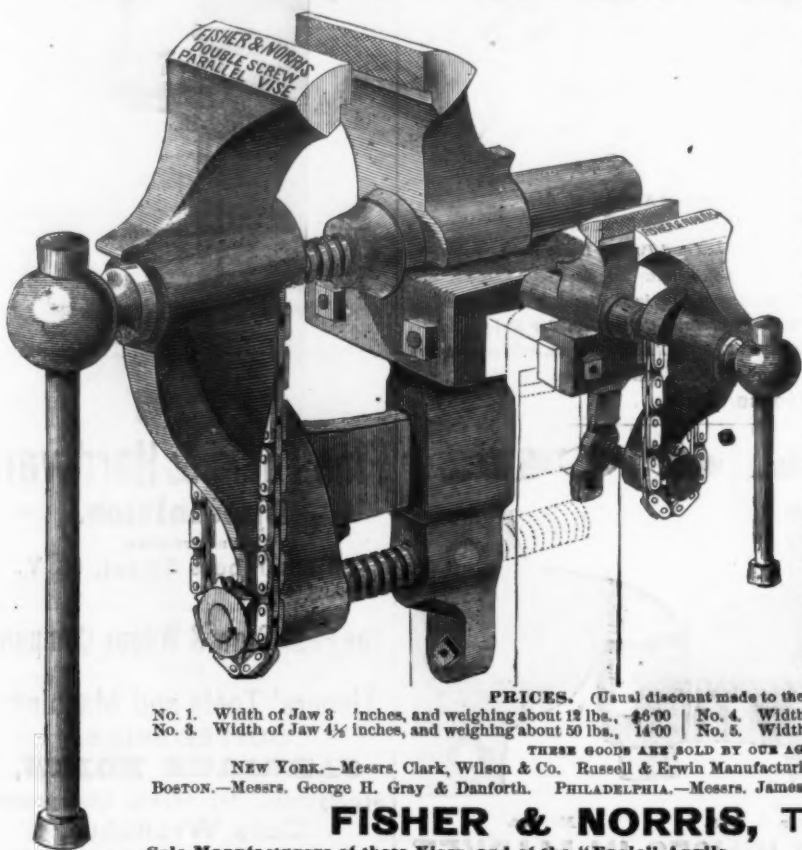
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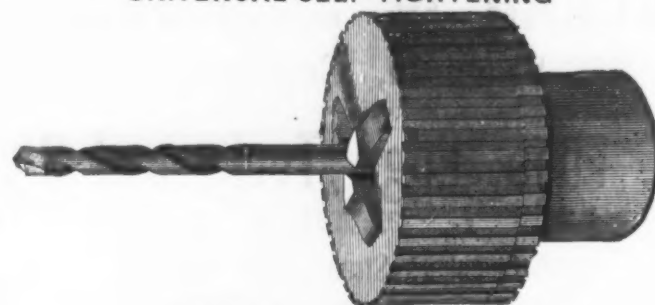
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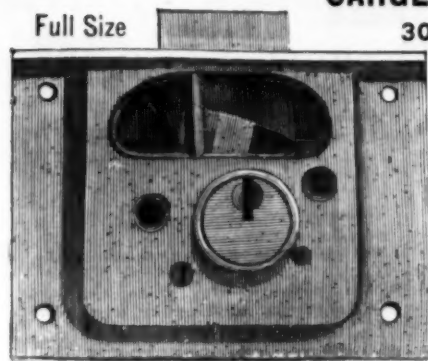
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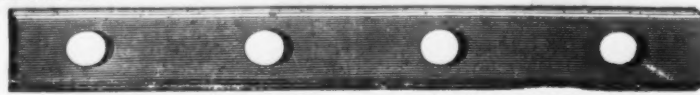


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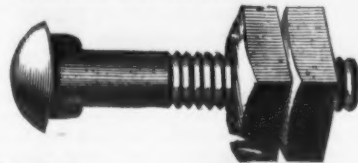
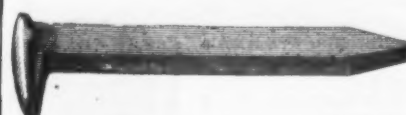
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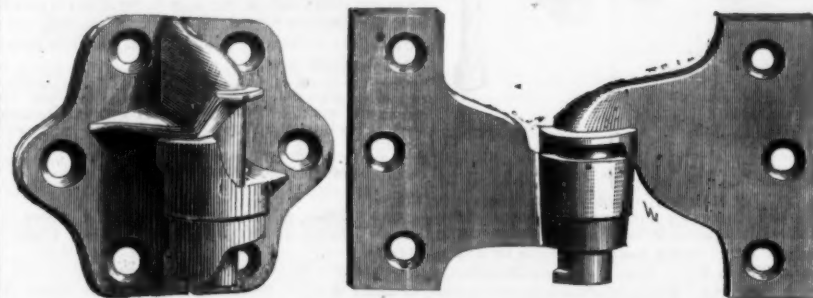
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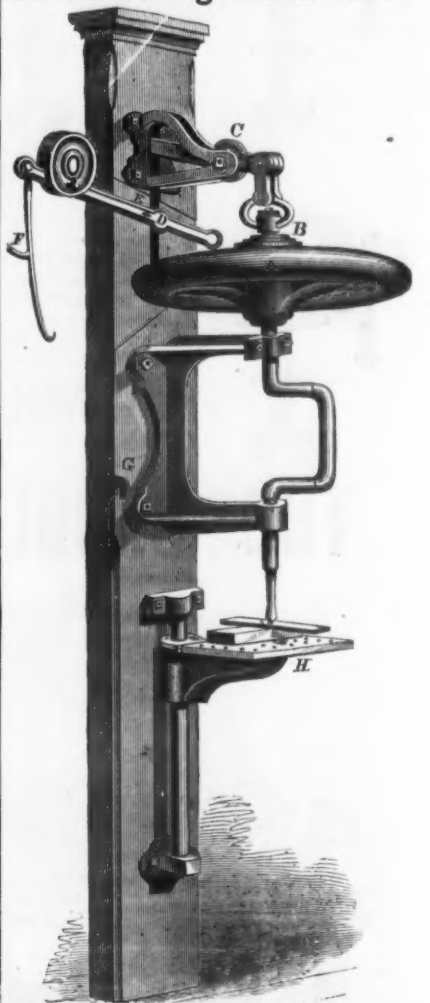
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Clips, Axi.

Norway or Best. \$ 20 @ 30
Superior. \$ 40 @ 45

Coal Shovels.

Iron Handled. \$ doz, \$ 85 @ 1 25
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Smith, Burns & Co. \$ 25
No. 14 15 16 17 18
Japanned, \$ 9 00 9 75 10 50 12 00 13 50 per doz
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Brass Racking. \$ 10 @ 10
Lock and Globe. \$ 10

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Better Grades. \$ 10
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Fren: Steel. \$ 10 @ 20
"Champion". \$ 20

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Excelsior. \$ 30
Peck, Stow & Wilcox. \$ 20

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Chas. E. Little. \$ 15 @ 20

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Crucibles. No. 5 5c

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Taylor's Pattern Petroleum. \$ 20 @ 10
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Jowitt's. 5 25 to \$ 2 gold
" Western. 5 00 to \$ 2 net
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Beam & Murray, "Cyclops". 4 85 to \$ 2 gold
Fisher's. 4 75 to \$ 2 gold
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No. 1 2 3 4 5 6 7 8

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Claw. \$ doz \$ 7 50 8 00 8 50
Lathing. \$ doz \$ 7 00 7 50 8 00

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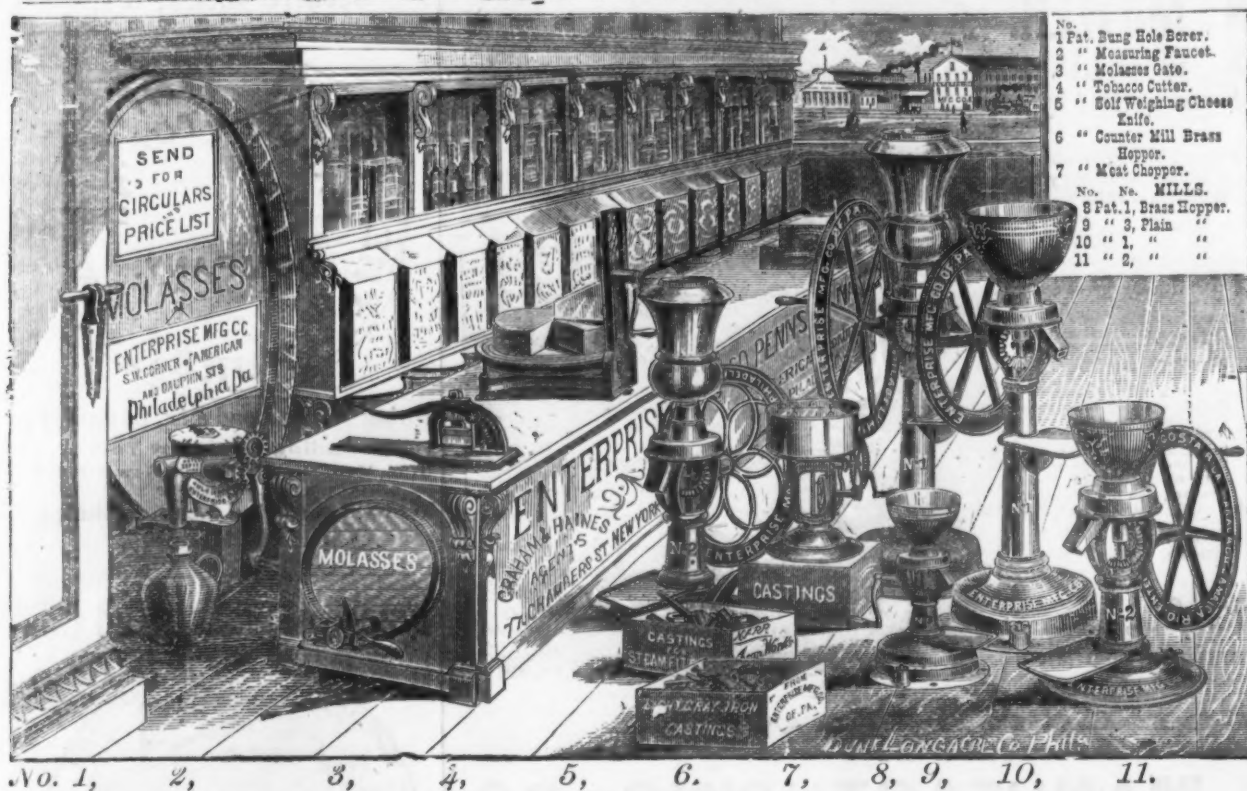
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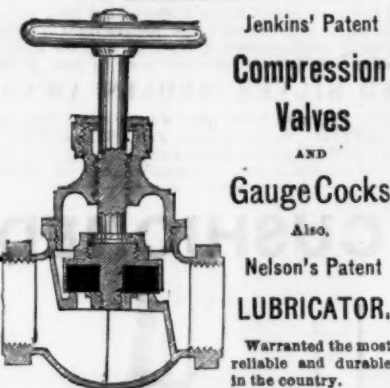
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WROUGHT HAMMER STRAPS, HEAVY PATTERN.
16c each

STAY CHAIN HOOKS.
light pattern..... 15c each

STRAP BOLTS, RODS, SINGLE TREE IRONS, BOLSTER PLATES.
Brake Ratchet, Hammer Straps, Hub Irons, Stay Chain Hooks and Clips, in lots of 50 set..... \$10 @ 15

WAGON BOX STAPLES, 1 1/2 TO 2 1/2 IN. IN CLITCH.
per 1000, \$14 00 net

NECK YOKE EYES, EACH.
per 1000, \$11 00 net

NECK YOKE EYES, WITH 1/2 INCH RINGS.
per 1000, \$11 00 net

WAGON RIVETS, EX. LARGE, OVAL AND STEEP HEAD.
1/2 in. diam., all lengths..... \$10 @ 15

WAGON RIVETS, 3/16 INCH DIAM., ALL LENGTHS.
\$10 @ 15

WAGON RIVETS & NAILS IN 5 lb PAPER BOXES.
\$10 @ 15

COUPLING PLATES.
\$10 @ 15

DOUBLE TREE PINS.
\$10 @ 15

TONGUE PLATES.
\$10 @ 15

NECK YOKE PLATES.
\$10 @ 15

TONGUE CAP IRON, 1 1/2, 2 AND 2 1/2 IN. WIDE, SAME PRICE.
\$10 @ 15

WAGON CHAINS, STAY LOCK AND TONGUE.
5-16 in., 12c; 1/2 in., 14c.

NAILS, BRADS, SPIKES, ETC.
CUT NAIL LIST.

10d TO 60d NAILS, FENCE AND BRADS.
\$5 50

8d AND 9d NAILS, FENCE AND BRADS.
\$5 75

6d AND 7d NAILS, FENCE AND BRADS.
\$6 00

4d AND 5d NAILS, FENCE AND BRADS.
\$6 25

3d NAILS, FENCE AND BRADS.
\$6 50

2d NAILS, FENCE AND BRADS.
\$7 00

1d NAILS, FENCE AND BRADS.
\$7 25

TOBACCO.
FINE BLEND..... \$8 25

BARREL.
1 1/2 inch..... \$6 25

1 1/2 inch.
\$6 50

1 1/2 inch.
\$7 00

1 1/2 inch.
\$7 25

1 1/2 inch.
\$7 50

1 1/2 inch.
\$7 75

1 1/2 inch.
\$8 00

1 1/2 inch.
\$8 25

1 1/2 inch.
\$8 50

1 1/2 inch.
\$8 75

1 1/2 inch.
\$9 00

1 1/2 inch.
\$9 25

1 1/2 inch.
\$9 50

LANTERNS "PEERLESS," NO. 1.
\$10 @ 15

"RADIANT."
\$10 @ 15

KNOB-DOOR.
\$10 @ 15

LOCKS-DOOR.
\$10 @ 15

MACHINES-APPLE PARING.
\$10 @ 15

TIMMEN'S.
\$10 @ 15

DOWLING, MERCHANT'S, NO. 1.
\$10 @ 15

MILLS, COFFEE-BOX AND SLIDE, COMMON.
\$10 @ 15

BOX UNION AND EAGLE.
\$10 @ 15

SWIFT'S PATENT.
\$10 @ 15

"CHAMPION."
\$10 @ 15

NAILS-CUT, CHEAPENACE.
\$10 @ 15

CLOUT AND FINISHING.
\$10 @ 15

SHOE, AUSEABLE.
\$10 @ 15

"CLINTON."
\$10 @ 15

PACKING-RUBBER.
\$10 @ 15

PENCIL, SLATE-SCAPSTONE.
\$10 @ 15

CASE LOTS.
\$10 @ 15

PAINT-WHITE LEAD, U. S. GOVT.
\$10 @ 15

RIVETS-IRON, BLACK AND TINNED.
\$10 @ 15

ROPE-MANILA, 1/2 INCH AND LARGER.
\$10 @ 15

STAPLES-BLIND, BOARDMAN'S PAT.
\$10 @ 15

SKATES-WHITE.
\$10 @ 15

STRAPS, SKATE-RUNSET AND BLACK.
\$10 @ 15

SPOONS-IRON TINNED.
\$10 @ 15

PLATED ROGERS' A. NO. 1.
\$10 @ 15

SQUARES-STEEL AND IRON.
\$10 @ 15

SHOES, HORSERACK & SONS.
\$10 @ 15

SHOES & SPADES-SHEPARD, FOWLE & DENNISON.
\$10 @ 15

SAWS-HENRY DIAMOND & SONS.
\$10 @ 15

SCALES-BUFFALO SCALE WORKS.
\$10 @ 15

FAIRBANKS.
\$10 @ 15

SCREWS-NATIONAL SCREW CO.
\$10 @ 15

SHEARS-SEYMOUR'S.
\$10 @ 15

TRAPS-STEEL-NEWHOUSE.
\$10 @ 15

TACKS-HALF WEIGHT AM. IRON.
\$10 @ 15

TOOLS-TINNED.
\$10 @ 15

WRENCHES.
\$10 @ 15

COES GENUINE.
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Imitation Wrought Bar..... \$10 @ 15

FILES.
\$10 @ 15

Steel.

THREE
1st CLASS PRIZE MEDALS.
CLASSES 1, 21, 22,
Great Exhibition of Industry,
LONDON, 1864.

MEDAL OF HONOUR,
SOCIETY OF ARTS & INDUSTRY,
LONDON, 1866.

1st CLASS
PRIZE MEDAL, CLASS 1st
UNIVERSAL
EXHIBITION OF INDUSTRY
PARIS, 1865.

COCKER BROTHERS

SUCCESSORS TO

SAM'L COCKER & SON,

(Established 1752.)

SHEFFIELD, ENGLAND

MANUFACTURERS OF

CAST, SHEAR, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.

BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO

GENERAL MERCHANTS.

Agent, JONATHAN HATTERSLEY, Cincinnati, Ohio

WM. JESSOP & SONS,

MANUFACTURERS OF

STEEL,

AND IMPORTERS OF IRON
SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:

NEW YORK, Nos. 91 and 93 John Street. BOSTON, Nos. 133 and 135 Federal Street.

AGENCIES:

PHILADELPHIA, Jas. C. Hand & Co. PROVIDENCE, Corbett, Nightingale & Co.
CHICAGO, Crerar, Adams & Co. ST. LOUIS, Henry Bakewell & Sons.
CINCINNATI, Augustus Wesel. NEW ORLEANS, Folger & Co.
SAN FRANCISCO, Russell & Erwin Manufacturing Co.

F. W. MOSS,

Successor to JOSHUA MOSS & GAMBLE BROTHERS,
MANUFACTURER AND IMPORTER OF

STEEL AND FILES.

Principal Depots: 80 John Street, New York, and 512 Commerce Street, Philadelphia.

MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,

Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURN

PUNCHES, and all kinds of MACHINISTS' TOOLS.

Celebrated Improved Mild Centre Cast Steel, for Taps, Hammers, and Milling Tools.

warranted not to crack in hardening Taps of any size.

Swede Spring Steel, especially adapted to Locomotive and Railway Car Springs.

English Spring and Flow Plate Steel.

Sheet Cast Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel

And GENERAL MERCHANT.

A. M. F. WATSON, General Agent.

WILSON HAWKSWORTH, ELLISON & CO.,

MANUFACTURERS OF

STEEL, STEEL WIRE, &C.,

AND GENERAL MERCHANTS,

CARLISLE WORKS, SHEFFIELD, ENGLAND.

AGENCIES:

New York, 72 John Street.

Philadelphia, 505 Commerce Street.

Boston, 6 and 8 Liberty Square.

BARROW HEMATITE STEEL COMPANY

LIMITED.

BARROW IN FURNESS,

LANCASHIRE, England

MANUFACTURERS OF

STEEL RAILS, TYRES, WHEELS,

Axles, Shafting, Boiler and Ship Plates, Bessemer Pig Iron, &c., &c.

CHAS. CONGREVE & SON,

SOLE AGENTS FOR THE U. S.,

104 and 106 John Street, opposite Cliff Street, NEW YORK.

J. & RILEY CARR,

MANUFACTURERS OF SUPERIOR

STEEL

For Tools, Cutlery, Saws, Files, Augers, Gimblets, &c.; Sheet Cast Steel for
SPRINGS AND STAMPING COLD;

ALSO THE CELEBRATED

DOG BRAND FILES,

Unsurpassed, if equaled, in quality.

Barley Lane Works, Sheffield, England.

Warehouse 82 John St., New York.

Established 1810.



HENRY MOORE, Attorney.

Steel.

SANDERSON BROTHERS & COMPANY,

(LIMITED)

MANUFACTURERS OF THE

CELEBRATED CAST STEEL,

WARRANTED MOST SUPERIOR FOR TOOLS.

DARNALL WORKS,
ATTERCLIFFE FORGE,
WEST STREET WORKS,

SHEFFIELD, ENGLAND.

IMPORTERS OF FILES,

AND

AGENTS FOR ARMITAGE'S GENUINE MOUSEHOLE ANVILS.

NEW YORK, Edward Frith, 16 Cliff.

BOSTON, H. L. Richards, 18 Battery March.

PHILADELPHIA, Wm. H. Sowers.

CLEVELAND, O., Cleveland, Brown & Co.

NEW ORLEANS, Rich'd Rhodes, 71 Camp.

BALTIMORE, Md., Wm. H. Cole.

MONTREAL, Saint Paul St.

NEW HAVEN, Ct., Atwater, Wheeler & Co.

FRANCIS HOBSON & SON,

97 John Street, NEW YORK,

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

JOHN HOGAN, Agent.

S. & C. WARDLOW,

MANUFACTURERS OF THE CELEBRATED

Cast and Double Shear STEEL,

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table, Carving,
Butcher and Shoe Knives, Turning Tools, Dies, Files, Clock or other Springs,
Saws and Tools of every variety.

SHEFFIELD, ENGLAND.

Office of S. & C. WARDLOW, 13 Gold Street, New York.

*In calling the attention of consumers of Steel in
any of the markets above enumerated, we would respectfully assure
them of our ability to supply an article, that cannot be equalled in
quality, temper, and adaptation in all respects to the various purposes
for which it may be required. Having a century of practical experi-
ence in all departments of Steel manufacture, a long established
reputation in England, and the Command of Europe, and in the Eastern
States principally of this Country, encourage us to solicit a universal
trial of our Steel for the above or other purposes for which a first
class material in quality, temper, and durability is needed.*

G. SANDERSON & CO.,

Manufacturers of all descriptions of

STEEL.

Barley Street and Broad Lane Steel Works, SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for

Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &c.

ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &c.

Hot and Cold Rolled Sheets for Clock Springs, Corset Clasps, Pens, &c.

Makers of the Celebrated ROCK BORING DRILL STEEL.

Warehouse, 96 John Street, New York.

A. J. NELLIS & CO., Pittsburgh, Pa.

MANUFACTURERS OF

Agricultural Steels
and Irons

OF ALL KINDS AND SIZES.
DRILLED, BOLTED, FIN-
ISHED AND TEMPERED TO
SUIT ALL KINDS OF SOIL.

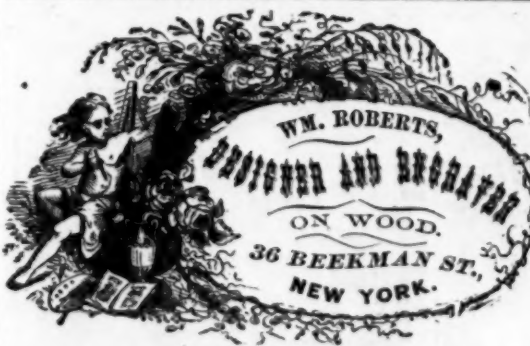
'Nellis'
Original Harpoon Horse Hay

Fork Improved.

'Nellis'
Grapple & Pulleys.

Send for Pamphlet.

With the exception of our Horse Hay Fork and Fixtures we make no
complete implement. Agricultural Steels and Irons we make a spe-
cialty. From the universal approval our goods have secured by actual
test in the hands of Implement Makers and Farmers from the Atlantic
to the Pacific, and with our facilities, experience and improvements,
we frankly assure the Trade of our ability to meet the requirements of
the age. All of our Steel Goods have imprint of our Trade Mark.



Established 1838.
EVERY DESCRIPTION OF EN-
GRAVING FOR

BOOK, CATALOGUE OR
NEWSPAPER USE
done at short notice.

Machinery.

VIEWS OF BUILDINGS

A SPECIALTY.

FIRST-CLASS WORK AT LOW

PRICES.

SATISFACTION GUARANTEED.

PHENIX

FIRE AND MARINE INSURANCE CO.,

Brooklyn, N. Y.

Principal Office, No. 173 Broadway.

Cash Capital.....\$1,000,000.00

Net Cash Assets.....\$1,362,000.00

BIRMINGHAM, ENGLAND
SAMUEL A. GODDARD & CO.,

Commission Merchants and General Agents,

execute orders for British manufactures on the lowest

terms, and collect and forward goods for a very mod-

erate payment. Agents for the sale of North Staf-

fordshire Iron of a standard quality.

Steel.

Sheffield Steel Works.

(Established in 1848.)

SINGER, NIMICK & CO.

Pittsburgh, Pa.,

Manufacturers of Extra Quality Tool

CAST STEEL,

Patent Rolled

SAW PLATES,

All descriptions of Cast and German

Spring and Plow Steel

Elliptic and Side Springs, Seat Springs,

AXLES, STEEL TIRE,

Plow Wings, Shares, Cultivators,

Reaper Bars, Crow Bars, &c., &c.

Warehouse, 83 Water and 100 First Streets.

ISAAC JENKS,

Minerva Iron & Steel Works,

Wolverhampton, England;

MANUFACTURER OF:

"Jenks' Spring Steel," and Cast
Spring Steel,

Also, TIRE, TOE CORK, SLEIGH SHOE, BLISTER
AND PLOW STEEL.

VAN WART & MCCOY,

SOLE AGENTS,

43 Chambers St., New York.

A full assortment of "Jenks' Spring Steel," in stock.

MILLER, BARR & PARKIN,

Orescent Steel Works,

PITTSBURGH, PA.,

Manufacturers of all descriptions of

STEEL

EQUAL TO ANY IN THE MARKET.

Office.....339 Liberty St.,

PITTSBURGH, PA.

Gunpowder.

GUNPOWDER.

DUPONT'S

Sporting, Shipping, and Mining

POWDER.

DUPONT'S GUNPOWDER MILLS,

ESTABLISHED IN 1801,

Have maintained their great reputation for 70
years. Manufacture the

Celebrated Eagle Ducking, Eagle Rifle
and Diamond Grain Powder.

Also, SPORTING, MINING, SHIPPING, AND BLAST-
ING POWDER

of all kinds and descriptions.

For sale in all parts of the country. Represented

by

F. L. KNEELAND,

70 Wall Street, NEW YORK.

CUN-POWDER

LAFLIN & RAND POWDER CO.,

21 Park Row, New York,

invite the attention of the Hardware Trade to
their facilities for delivering

BLASTING, MINING and RIFLE

POWDER

IN EVERY PART OF THE UNITED STATES,

from having agencies and magazines at all prominent

points, beside our works at

Newburg, Saugerties, Kingston, and

Catskill, N. Y.; Scranton, Carbon-

dale, and Pottsville, Pa.; Balti-

more, Md., and Plattsville, Wis.

The superiority is well known of our brands

Rifle Powder:

Orange Rifle, Orange Ducking

Lightning, Audubon,

SAFETY-FUSE at wholesale,

Steel.

HUSSEY, WELLS & CO.

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL,

INCLUDING

Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

Railroad Supplies, Homogeneous Plates

FOR LOCOMOTIVES, BOILERS AND FIRE BOXES,

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &c.

ALSO, MANUFACTURERS OF THE CELEBRATED BRAND

"Hussey, Wells & Co. Cast Spring Steel,"

For Elliptic Springs for Railroad Cars & Locomotives.

PENN AND SEVENTEENTH STS., PITTSBURGH, PA.

BRANCH OFFICES:

30 Gold St., New York. 139 & 141 Federal St., Boston. 88 Michigan Ave., Chicago.

Pittsburgh Steel Works

ESTABLISHED IN 1845.

ANDERSON & WOODS,

MANUFACTURERS OF

BEST REFINED CAST STEEL,

Cast and German Plow and Spring Steel,

FIRST AVE. AND ROSS ST., PITTSBURGH.

BRANCH HOUSES:

Nos. 74 and 75 North Street, Boston. C. H. WHITNEY & SON, 142 Greenwich Street, New York. W. F. POTTS, SON & CO., 125 Market Street, Philadelphia.

First Prize awarded at Fair of American Institute, 1870.

CHROME STEEL COMPANY,

MANUFACTURERS OF BEST

CAST STEEL,

WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—FOR EVERY PURPOSE.

Works and Offices—Kent Avenue and Keap Street, Brooklyn, E. D.

W. W. W. WOOD, President. C. P. HAUGHIAN, Superintendent.

JOHN A. GRISWOLD & CO.,

Troy, N. Y.

J. A. GRISWOLD. E. CORNING. E. CORNING, JR. C. GRISWOLD.

PROPRIETORS OF THE

Rensselaer Iron Works, Fort Edward Blast Furnace, Bessemer Steel Works, And Columbia Blast Furnace.

MANUFACTURERS OF

Pig Iron, Railroad Iron, Merchant and Ship Iron,

BESSEMER STEEL RAILS, AXLES, TIRES, SHAFTING,

PLATES AND STEEL FORGINGS OF ALL DESCRIPTIONS.

New Jersey Steel and Iron Company.

Trenton, N. J.,

Represented by COOPER, HEWITT & CO., 17 Burling Slip, New York,

MAKERS OF

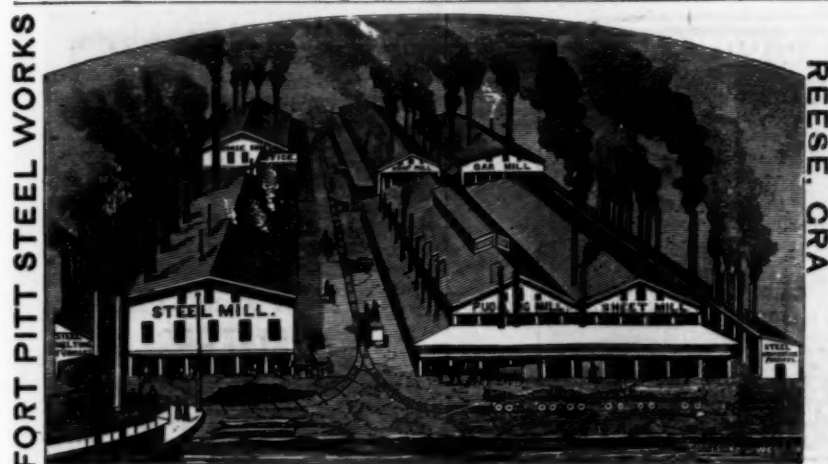
ROLLED IRON BEAMS.

Channel Bars, the Trenton Steel Top Rails, &c., &c. Refined Iron, Brazier and Wire Rods.

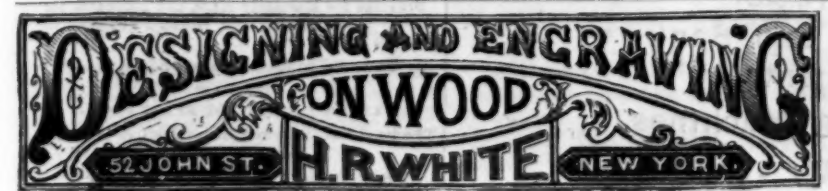
ALSO,

THE MARTIN STEEL,

For Machinery Uses and Fire-Box Plates.



Pittsburgh, Pa.

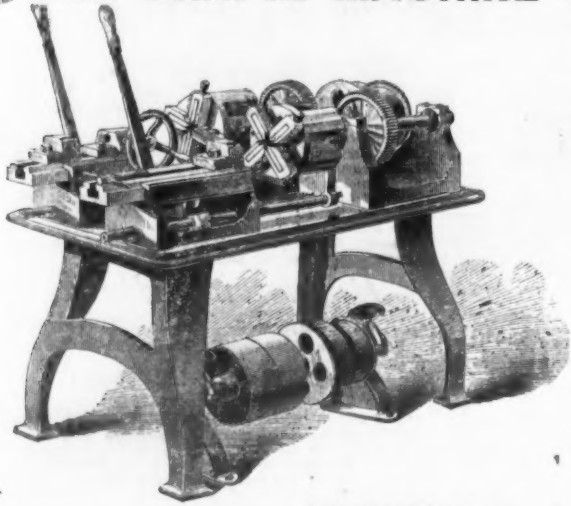


Chicago Metal Market.

(Reported by Cragin Bros. & Co., 141, 143, and 145 Lake street.) CHICAGO, Feb. 25, 1873.

Tin Plate.	
IC, 10x14, Coke.....	\$15 50
IC, 10x14, Charcoal.....	14 50
IC, 10x14, ".....	13 50
IC, 12x12, Coke.....	15 00
IC, 12x12, Charcoal.....	14 50
IC, 12x12, ".....	13 50
IC, 14x20, Coke.....	15 50
IC, 14x20, Charcoal.....	14 50
IC, 14x20, ".....	13 50
IC, 14x20, Coke Roofing.....	14 00
IC, 14x20, Charcoal Roofing.....	13 50
IC, 14x20, ".....	12 50
IC, 20x28, ".....	14 50
Pig Tin.	
Large, 60 lb.....	40c
Small, 30 lb.....	41c
Zinc.	
In casks 100 lbs.....	10 1/2c
In casks 50 lbs.....	10 1/2c
Copper.	
Copper Bottoms.....	45c
Sheathing Copper.....	45c
Planned Copper, 14x20.....	51c
Nos. 7 8 9 Planned Copper.....	50c
Braziers' Sheets, 30x60.	
6 to 8 lbs.....	51c
10 and 12 lbs.....	51c
15 to 100 lbs.....	45c
Solder.	
Fin 25x25, Co.'s B'nd.....	25c
Fin 25x25, Co.'s B'nd.....	25c
Babbitt Metal.	
Galvanized Iron Conductor Pipe.....	15c
Sheet Iron.....	15c
Common. Smooth. Charcoal.	
No. 14 to 24.....	7 1/2c
25 to 28.....	7 1/2c
29 to 32.....	7 1/2c
33 to 36.....	7 1/2c
37 to 40.....	7 1/2c
41 to 44.....	7 1/2c
45 to 48.....	7 1/2c
49 to 52.....	7 1/2c
53 to 56.....	7 1/2c
57 to 60.....	7 1/2c
Galvanized Iron.	
No. 14 to 24.....	15c
25 to 28.....	15c
29 to 32.....	15c
33 to 36.....	15c
37 to 40.....	15c
41 to 44.....	15c
45 to 48.....	15c
49 to 52.....	15c
53 to 56.....	15c
57 to 60.....	15c
Russia Iron.	
Perfect, all numbers.....	30c
In 10 lb.....	30c
Braziers' Rods.	
1/4 in., 10 ft. long.....	1 1/2c
1/2 in., 10 ft. long.....	1 1/2c
3/4 in., 10 ft. long.....	1 1/2c
1 in., 10 ft. long.....	1 1/2c
1 1/4 in., 10 ft. long.....	1 1/2c
1 1/2 in., 10 ft. long.....	1 1/2c
1 3/4 in., 10 ft. long.....	1 1/2c
2 in., 10 ft. long.....	1 1/2c
2 1/4 in., 10 ft. long.....	1 1/2c
2 1/2 in., 10 ft. long.....	1 1/2c
2 3/4 in., 10 ft. long.....	1 1/2c
3 in., 10 ft. long.....	1 1/2c
3 1/4 in., 10 ft. long.....	1 1/2c
3 1/2 in., 10 ft. long.....	1 1/2c
3 3/4 in., 10 ft. long.....	1 1/2c
4 in., 10 ft. long.....	1 1/2c
4 1/4 in., 10 ft. long.....	1 1/2c
4 1/2 in., 10 ft. long.....	1 1/2c
4 3/4 in., 10 ft. long.....	1 1/2c
5 in., 10 ft. long.....	1 1/2c
5 1/4 in., 10 ft. long.....	1 1/2c
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7 1/4 in., 10 ft. long.....	1 1/2c
7 1/2 in., 10 ft. long.....	1 1/2c
7 3/4 in., 10 ft. long.....	1 1/2c
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58 3/4 in., 10 ft. long.....	1 1/2c
59 in., 10 ft. long.....	1 1/2c
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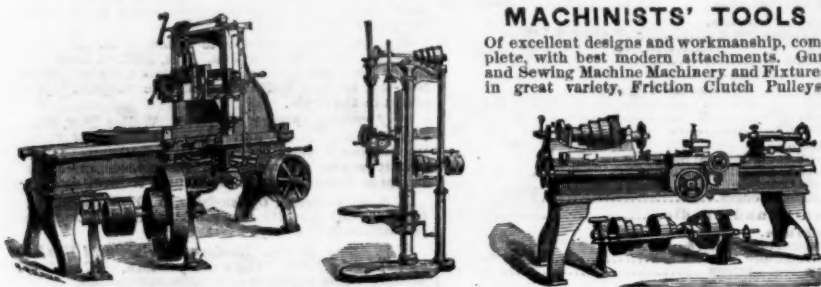
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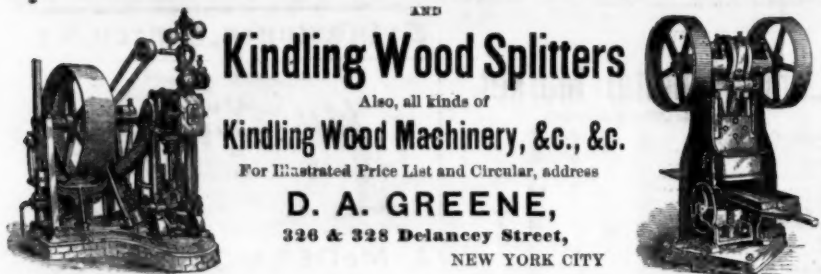
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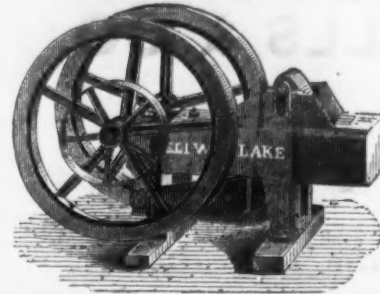
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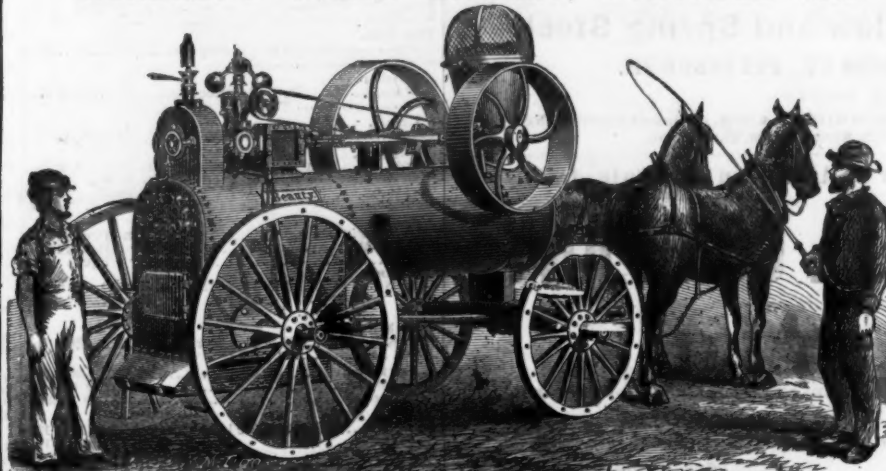
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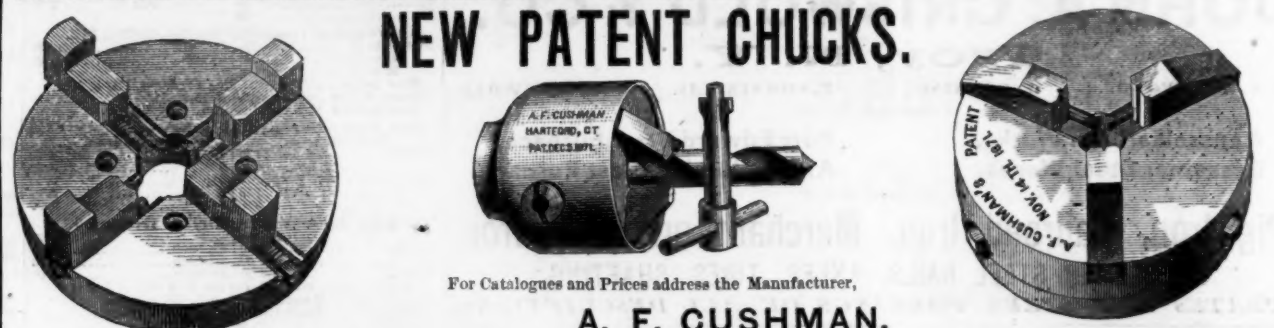
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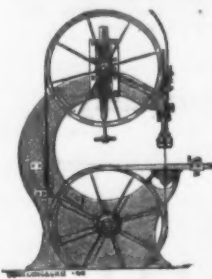
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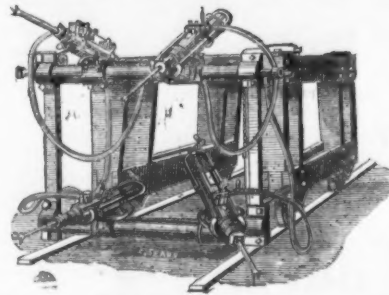
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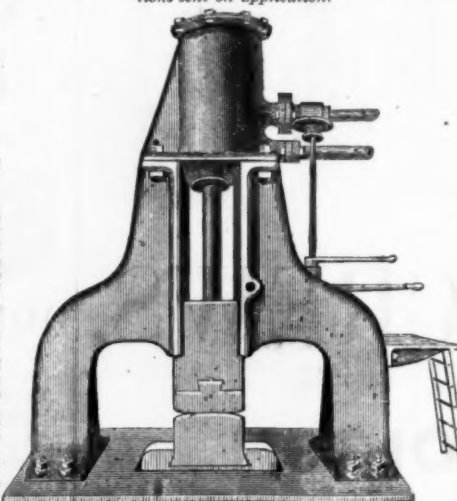
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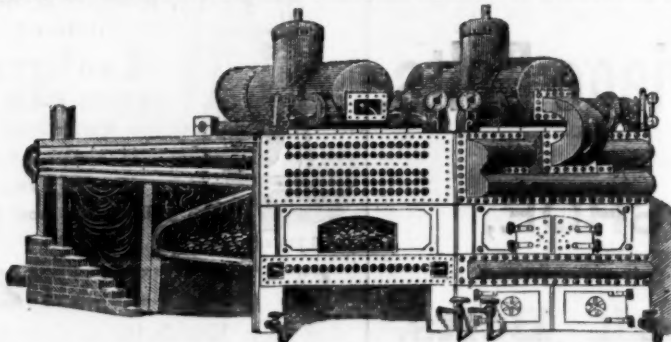
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